U.S. Department of Energy
Hanford Site

22-SGD-002734 September 19, 2022

Mr. David Bowen, Program Manager
Nuclear Waste Program
Washington State Department of Ecology
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Richland, Washington 99354

Dear Mr. Bowen:

INTERIM STATUS GROUNDWATER MONITORING PLAN FOR THE 216-A-36B PUREX PLANT CRIB, DOE/RL-2010-93, REVISION 4

This letter transmits the Interim Status Groundwater Monitoring Plan for the 216-A-36B PUREX Plant Crib, DOE/RL-2010-93, Revision 4, to the Washington State Department of Ecology.

If you have any questions, please contact me, or your staff may contact Doug Hildebrand, Senior Technical Advisor, Soil and Groundwater Division on (509) 373-9626.

Sincerely,

MICHAEL CLINE Digitally signed by MICHAEL CLINE
Date: 2022.09.19 13:09:06 -07'00'

Michael W. Cline, Director
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SGD:KLH

Attachment

cc: See page 2

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Environmental Portal

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Attachment
22-SGD-002734

Interim Status Groundwater Monitoring Plan
for the 216-A-36B Purex Plant Crib

(DOE/RL-2010-93-Rev 4)

(67 pages including cover sheet)

DOE/RL-2010-93
Revision 4

Interim Status Groundwater Monitoring Plan for the 216-A-36B PUREX Plant Crib

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Terms

AEA	*Atomic Energy Act of 1954*
DOE	U.S. Department of Energy
DWMU	dangerous waste management unit
Ecology	Washington State Department of Ecology
EER	engineering evaluation report
EPA	U.S. Environmental Protection Agency
FWS	Field Work Supervisor
PUREX	Plutonium Uranium Extraction Plant
QAPjP	quality assurance project plan
RCRA	*Resource Conservation and Recovery Act of 1976*
TOC	total organic carbon
TOX	total organic halogen
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*

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1 Introduction

This document presents a revised groundwater monitoring program for the 216-A-36B Crib, and when issued into the operating record becomes the principal controlling document for conducting groundwater monitoring under the dangerous waste regulations (WAC 173-303, "Dangerous Waste Regulations") at the 216-A-36B Crib, superseding the previous plan (DOE/RL-2010-93, *Interim Status Groundwater Monitoring Plan for the 216-A-36B PUREX Plant Crib*, Rev. 3). The U.S. Department of Energy (DOE) is revising this groundwater monitoring plan to include information for a replacement well that was drilled in 2022 and provide an updated quality assurance project plan (QAPjP) and sampling protocol.

This groundwater monitoring plan is based on the requirements for interim status facilities, as defined by the *Resource Conservation and Recovery Act of 1976* (RCRA), with regulations promulgated by the Washington State Department of Ecology (Ecology) in the *Washington Administrative Code* and the *Code of Federal Regulations* by reference (WAC 173-303-400, "Interim Status Facility Standards"; 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Subpart F, "Ground-Water Monitoring"). This plan is required by 40 CFR 265.90(a) and (b), "Applicability," and is intended to satisfy groundwater monitoring requirements applicable to interim status treatment, storage, and disposal units (referred to as dangerous waste management units [DWMUs] in this plan) and monitors for indicator parameters in groundwater samples that are used to determine whether dangerous waste or dangerous waste constituents have entered the groundwater. This plan also monitors parameters used in establishing groundwater quality.

The 216-A-36B Crib is an inactive unit that received dangerous and nondangerous waste and is located in the 200 East Area of the Hanford Site in Washington State (overlying the 200-PO-1 Groundwater Operable Unit) (Figure 1-1). In accordance with Section I.A of WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste* (hereinafter referred to as the Hanford Facility RCRA Permit), the 216-A-36B Crib will continue under interim status until it is incorporated into Part III, V, or VI of the Hanford Facility RCRA Permit (or its successor) or until interim status is terminated. Therefore, groundwater monitoring for the 216-A-36B Crib continues under interim status requirements. For regulatory purposes, the boundary of the 216-A-36B Crib is identified on the Hanford Facility RCRA Permit Part A Form.

SGW-60595, *Engineering Evaluation Report for the 216-A-36B Crib Groundwater Monitoring*, is one of a suite of groundwater monitoring engineering evaluation reports (EERs) for regulated units located within the Hanford Site Central Plateau that were prepared to support Part B (final status) permit application material for the future Revision 9 of WA7890008967, *Hanford Facility Dangerous Waste Permit (Site-Wide Permit)* (hereinafter referred to as the Hanford Sitewide Permit). The EERs do not create any groundwater monitoring requirements; however, they contain comprehensive background information supporting groundwater monitoring for each regulated unit. Detailed area-wide and unit-specific groundwater evaluation methodology was used to assess the locations of existing wells and propose locations for new wells that would detect groundwater contamination that may occur from each regulated unit. For the 216-A-36B Crib, analysis of groundwater elevations and contaminant particle-tracking calculations, as well as an evaluation of vertical contaminant migration in groundwater, were performed to evaluate the existing monitoring well network.

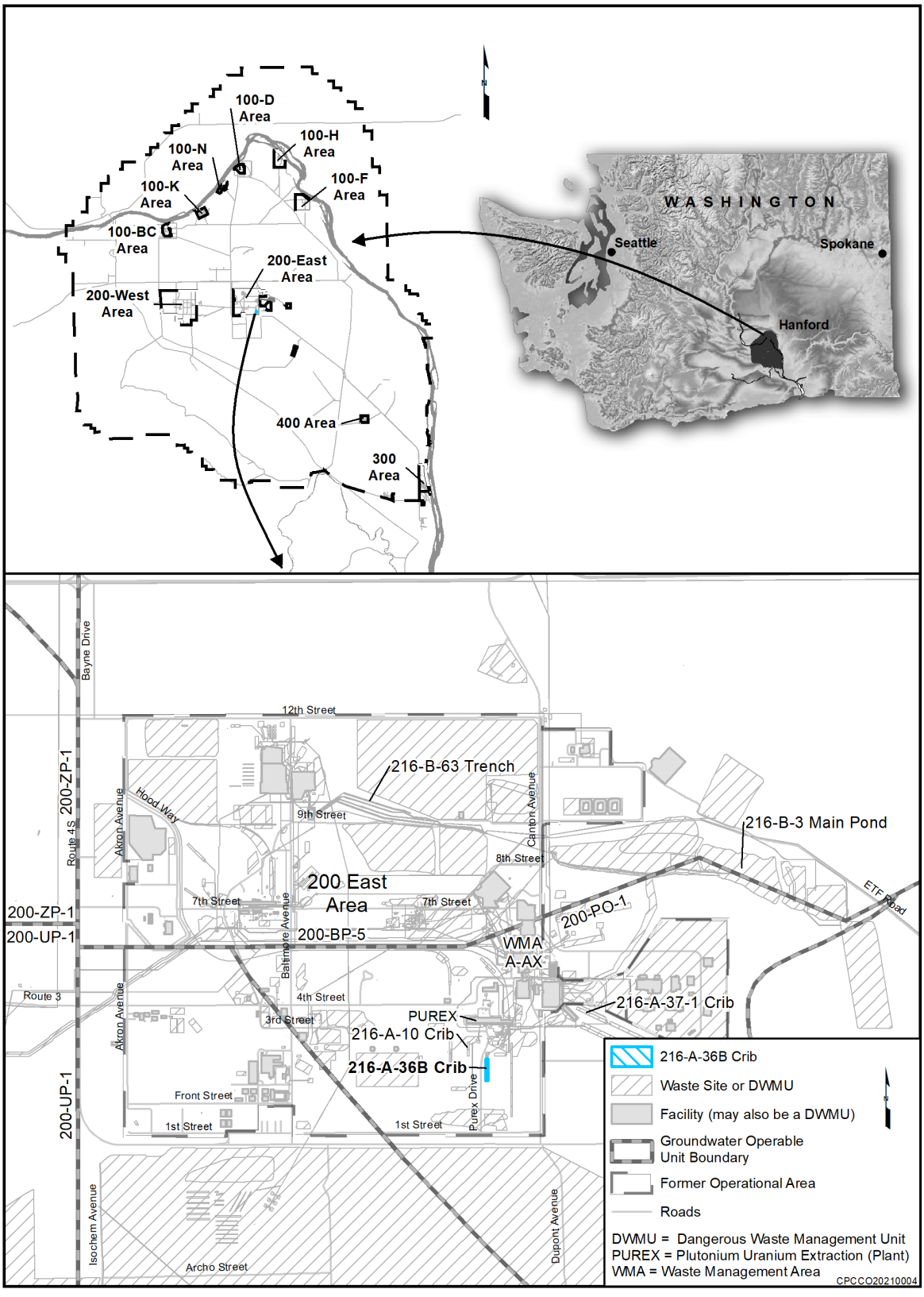

Figure 1-1. Location Map for the 216-A-36B Crib

The EERs provide the most updated source for unit-specific information related to groundwater monitoring, and the detailed information specific to the 216-A-36B Crib that is provided in SGW-60595 is included only by reference in this interim status groundwater monitoring plan. One of the primary objectives of the EERs is to identify a well network for the monitoring that is required at a final status unit under WAC 173-303-645, "Releases from Regulated Units." At the 216-A-36B Crib, the proposed final status network also meets the requirements for monitoring under the interim status regulations of WAC 173-303-400 and 40 CFR 265, Subpart F; therefore, the well network proposed in SGW-60595 is incorporated into this plan. Table 1-1 identifies the locations where information that is pertinent to this groundwater monitoring plan is presented in SGW-60595.

Table 1-1. Locations of Pertinent Supporting/Background Information in SGW-60595, *Engineering Evaluation Report for the 216-A-36B Crib Groundwater Monitoring*

Section/Subsection	Title/Topic
2.1	Background
2.1.1	Facility Description
2.1.2	Operational History
2.3	Waste Characteristics
2.4	Interim Status Monitoring Network and Sampling History
3.1	Stratigraphy
3.2	Hydrogeology
3.3	Groundwater Flow System
4	Contaminant Migration Conceptual Model
4.1	Vadose Zone
4.2	Soil Moisture Factors
4.3	Hydrogeologic Considerations
4.4	Groundwater Chemistry
5	Calculation Methods
6	Calculations
7	Simulation Results and Conclusions
9.3	Proposed Groundwater Monitoring Network
9.3.1	Groundwater Monitoring Well 299-E17-1
9.3.2	Groundwater Monitoring Well 299-E17-19
9.3.3	Groundwater Monitoring Well 299-E17-14
9.3.4	Groundwater Monitoring Well 299-E17-15
9.3.5	Groundwater Monitoring Well 299-E17-16
9.3.6	Groundwater Monitoring Well 299-E17-18

This groundwater monitoring plan includes the following chapters and appendices:

- Chapter 2 describes the groundwater monitoring program, including the wells in the monitoring network, constituents analyzed, and sampling frequency.
- Chapter 3 describes data evaluation and reporting.
- Chapter 4 provides an outline for a groundwater quality assessment plan.
- Chapter 5 contains the references cited in this plan.
- Appendix A provides information for the wells within the groundwater monitoring network.

The QAPjP and sampling protocols for this groundwater monitoring plan are included in CPCC-00417, *Quality Assurance Project Plan and Sampling Protocol for Interim Status Groundwater Monitoring Plans*.

1.1 Regulatory Basis

In May 1987, DOE issued a final rule (10 CFR 962, "Byproduct Material") stating that the hazardous waste components of mixed waste are subject to RCRA regulations. Ecology gained regulatory authority over the hazardous waste components of mixed waste on August 19, 1987.

In May 1989, DOE, the U.S. Environmental Protection Agency (EPA), and Ecology signed Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement). This agreement established the roles and responsibilities of the agencies involved in regulating and controlling remedial restoration of the Hanford Site, which includes the 216-A-36B Crib. Groundwater monitoring is conducted at the 216-A-36B Crib in accordance with WAC 173-303-400(3) (and, by reference, 40 CFR 265, Subpart F), which requires monitoring to determine whether the dangerous waste constituents from the 216-A-36B Crib have entered the groundwater in the uppermost aquifer underlying the unit.

Dangerous waste is regulated under RCW 70.105, "Hazardous Waste Management," and its Washington State implementing regulations (WAC 173-303). Radionuclides in mixed waste may include "source, special nuclear, and byproduct materials" as defined in the *Atomic Energy Act of 1954* (AEA). The AEA states that these radionuclide materials are regulated at DOE facilities, exclusively by DOE, acting pursuant to its AEA authority. Radionuclide materials are not hazardous/dangerous waste and therefore are not subject to regulation by the State of Washington under RCRA or RCW 70.105.

Groundwater monitoring at the 216-A-36B Crib was initiated in 1988, based on the interim status indicator evaluation program requirements of 40 CFR 265, Subpart F, and WAC 173-303-400. Groundwater monitoring at the crib was required by a regulatory order (Ecology, 1987, *Order No. DE 87-295*). To satisfy the well installation requirements of the regulatory order, a letter was provided to Ecology (Izatt, 1988, "Compliance Order DE 87-295"), which described the status of drilling and sampling of wells at the 216-A-36B Crib and contained an informal groundwater monitoring plan. In 1994, an indicator evaluation groundwater monitoring plan that included both the 216-A-10 Crib and the 216-A-36B Crib was issued (WHC-SD-EN-AP-170, *Interim-Status Groundwater Monitoring Plan for the 216-A-10 and 216-A-36B Cribs*).

In 1997, an interim status groundwater quality assessment monitoring program (PNNL-11523, *Combination RCRA Groundwater Monitoring Plan for the 216-A-10, 216-A-36B, and 216-A-37-1 PUREX Cribs*) was initiated in accordance with 40 CFR 265(d)(3) and (d)(4) (as referenced by WAC 173-303-400). The program combined groundwater monitoring for the 216-A-10,

216-A-36B, and 216-A-37-1 Cribs ("Plutonium Uranium Extraction Plant [PUREX] Cribs") into one plan based on their proximity to one another and similar construction, waste history, and hydrogeologic regime (Chapter 1.0 in PNNL-11523). Groundwater monitoring was performed under a groundwater quality assessment program due to elevated specific conductance at well 299-E17-9 (which monitored the 216-A-36B Crib) and the recognition that the cribs had contributed to groundwater contamination.

In 2010, the 216-A-36B Crib was separated from the PUREX Cribs combined groundwater monitoring program and entered into an indicator parameter evaluation program under 40 CFR 265, Subpart F, and WAC 173-303-400. The change was a result of the following (Introduction and Section 2.2 in DOE/RL-2010-93, Rev. 0):

- In 2010, it was determined that the 216-A-10 Crib did not receive mixed waste after the effective date of the mixed waste rule in Washington State (August 19, 1987) and was no longer subject to regulation as a DWMU.
- The distance between the 216-A-36B and 216-A-37-1 Cribs was great enough that separate monitoring networks were appropriate for the cribs.
- The primary nonradioactive groundwater contaminant identified during assessment monitoring was nitrate, which is not a dangerous waste.

Therefore, in 2010, a site-specific indicator parameter groundwater monitoring plan (DOE/RL-2010-93, Rev. 0) was issued for the 216-A-36B Crib. Several updates to the monitoring plan have occurred during interim status with the most recent revision, DOE/RL-2010-93, Rev. 3, issued in 2021. Interim status monitoring has since continued under an indicator evaluation program; further details of the groundwater monitoring history at the unit are available in Section 2.4 of SGW-60595.

1.2 Monitoring Objectives

The objective of the groundwater monitoring program at the 216-A-36B Crib is to determine the facility's impact, if any, on the quality of the underlying groundwater. This groundwater monitoring plan addresses specifically those applicable RCRA requirements for interim status DWMUs where no impact to groundwater has been identified. The regulatory requirements applicable to this groundwater monitoring plan are found in WAC 173-303-400(3) and 40 CFR 265.90 through 40 CFR 265.94, "Recordkeeping and Reporting." Table 1-2 identifies where each groundwater monitoring element of the pertinent regulation is addressed.

Table 1-2. Pertinent Interim Status Facility Groundwater Monitoring Requirements

Groundwater Monitoring Element	Pertinent Requirement[a]	Section Where Requirement is Addressed
Applicability	40 CFR 265.90, "Applicability:" (a) Within one year after the effective date of these regulations, the owner or operator of a surface impoundment, landfill, or land treatment facility which is used to manage hazardous waste must implement a ground-water monitoring program capable of determining the facility's impact on the quality of ground water in the uppermost aquifer underlying the facility, except as §265.1 and paragraph (c) of this section provide otherwise. (b) Except as paragraphs (c) and (d) of this section provide otherwise, the owner or operator must install, operate, and maintain a ground-water monitoring system which meets the requirements of §265.91, and must comply with §§265.92 through 265.94. This ground-water monitoring program must be carried out during the active life of the facility, and for disposal facilities, during the post-closure care period as well.	Chapter 1
Number and location of wells	40 CFR 265.91, "Ground-Water Monitoring System:" (a) A ground-water monitoring system must be capable of yielding ground-water samples for analysis and must consist of: (1) Monitoring wells (at least one) installed hydraulically upgradient (i.e., in the direction of increasing static head) from the limit of the waste management area. Their number, locations, and depths must be sufficient to yield ground-water samples that are: (i) Representative of background ground-water quality in the uppermost aquifer near the facility; and (ii) Not affected by the facility; and (2) Monitoring wells (at least three) installed hydraulically downgradient (i.e., in the direction of decreasing static head) at the limit of the waste management area. Their numbers, locations, and depths must ensure that they immediately detect any statistically significant amounts of dangerous waste or dangerous waste constituents that migrate from the waste management area to the uppermost aquifer.	Section 2.2 and Table 2-4
Well configuration	40 CFR 265.91: (c) All monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must be screened or perforated, and packed with gravel or sand, where necessary, to enable sample collection at depths where appropriate aquifer flow zones exist. The annular space (i.e., the space between the bore hole and well casing) above the sampling depth must be sealed with a suitable material (e.g., cement grout or bentonite slurry) to prevent contamination of samples and the ground water. Additional requirements from WAC 173-303-400(3)(c)(v)(C), "Dangerous Waste Regulations," "Interim Status Facility Standards": Ground water monitoring wells must be designed, constructed, and operated so as to prevent ground water contamination. Chapter 173-160 WAC may be used as guidance in the installation of wells.	Section 2.2 and Appendix A

Table 1-2. Pertinent Interim Status Facility Groundwater Monitoring Requirements

Groundwater Monitoring Element	Pertinent Requirement[a]	Section Where Requirement is Addressed
Sample protocols Analytical methods	40 CFR 265.92, "Sampling and Analysis:" (a) The owner or operator must obtain and analyze samples from the installed ground-water monitoring system. The owner or operator must develop and follow a ground-water sampling and analysis plan. He must keep this plan at the facility. The plan must include procedures and techniques for: (1) Sample collection; (2) Sample preservation and shipment; (3) Analytical procedures; and (4) Chain of custody control.	Appendix A in CPCC-00417, Section A3 and Appendix B in CPCC-00417, Sections B2 through B5
Parameters to be sampled Frequency of sampling Water-level measurements	40 CFR 265.92: (b) The owner or operator must determine the concentration or value of the following parameters in ground-water samples in accordance with paragraphs (c) and (d) of this section: (1) Parameters characterizing the suitability of the ground water as a drinking water supply, as specified in Appendix III[b]. (2) Parameters establishing ground-water quality: (i) Chloride (ii) Iron (iii) Manganese (iv) Phenols (v) Sodium (vi) Sulfate [Comment: These parameters are to be used as a basis for comparison in the event a ground-water quality assessment is required under §265.93(d).] (3) Parameters used as indicators of ground-water contamination: (i) pH (ii) Specific conductance (iii) Total organic carbon (iv) Total organic halogen (c)(1) For all monitoring wells, the owner or operator must establish initial background concentrations or values of all parameters specified in paragraph (b) of this section. He must do this quarterly for one year. (2) For each of the indicator parameters specified in paragraph (b)(3) of this section, at least four replicate measurements must be obtained for each sample and the initial background arithmetic mean and variance must be determined by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained from upgradient wells during the first year. (d) After the first year, all monitoring wells must be sampled and the samples analyzed with the following frequencies: (1) Samples collected to establish ground-water quality must be obtained and analyzed for the parameters specified in paragraph (b)(2) of this section at least annually.	Section 2.1 Appendix B in CPCC-00417, Section B2.2

Table 1-2. Pertinent Interim Status Facility Groundwater Monitoring Requirements

Groundwater Monitoring Element	Pertinent Requirement[a]	Section Where Requirement is Addressed
	(2) Samples collected to indicate ground-water contamination must be obtained and analyzed for the parameters specified in paragraph (b)(3) of this section at least semi-annually. (e) Elevation of the ground-water surface at each monitoring well must be determined each time a sample is obtained.	
Groundwater quality assessment program plan outline	40 CFR 265.93, "Preparation, Evaluation, and Response:" (a) Within one year after the effective date of these regulations, the owner or operator must prepare an outline of a ground-water quality assessment program. The outline must describe a more comprehensive ground-water monitoring program (than that described in §§265.91 and 265.92) capable of determining: (1) Whether hazardous waste or hazardous waste constituents have entered the ground water; (2) The rate and extent of migration of hazardous waste or hazardous waste constituents in the ground water; and (3) The concentrations of hazardous waste or hazardous waste constituents in the ground water.	Chapter 4
Methods used to evaluate the collected data and responses	40 CFR 265.93: (b) For each indicator parameter specified in §265.92(b)(3), the owner or operator must calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well monitored in accordance with §265.92(d)(2), and compare these results with its initial background arithmetic mean. The comparison must consider individually each of the wells in the monitoring system, and must use the Student's t-test at the 0.01 level of significance (see appendix IV) to determine statistically significant increases (and decreases, in the case of pH) over initial background. (c)(2) If the comparison for downgradient wells made under paragraph (b) of this section show a significant increase (or pH decrease), the owner or operator must then immediately obtain additional ground-water samples from those downgradient wells where a significant difference was detected, split the samples in two, and obtain analyses of all additional samples to determine whether the significant difference was a result of laboratory error. (d)(1) If the analyses performed under paragraph (c)(2) of this section confirm the significant increase (or pH decrease), the owner or operator must provide written notice to the department-within seven days of the date of such confirmation-that the facility may be affecting ground-water quality. (d)(2) Within 15 days after the notification under paragraph (d)(1) of this section, the owner or operator must develop a specific plan, based on the outline required under paragraph (a) of this section and certified by a qualified geologist or geotechnical engineer, for a ground-water quality assessment at the facility.	Sections 3.1, 3.2, 3.3 Appendix A in CPCC-00417

Table 1-2. Pertinent Interim Status Facility Groundwater Monitoring Requirements

Groundwater Monitoring Element	Pertinent Requirement[a]	Section Where Requirement is Addressed
Recordkeeping and reporting	40 CFR 265.93: (c)(1) If the comparisons for the *upgradient* wells made under paragraph (b) of this section show a significant increase or (pH decrease), the owner or operator must submit this information in accordance with §265.94(a)(2)(ii). 40 CFR 265.94, "Recordkeeping and Reporting:" (a)(1) Keep records of the analyses required in §265.92(c) and (d), the associated ground-water surface elevations required in §265.92(e), and the evaluation required in §265.93(b) throughout the active life of the facility. (a)(2) Report the following ground-water monitoring information to the department: (ii) Annually: Concentrations or values of the parameters listed in §265.92(b)(3) for each ground-water monitoring well, along with the required evaluations for these parameters under §265.93(b). The owner or operator must separately identify any significant differences from the initial background found in the upgradient wells, in accordance with §265.93(c)(1). (iii) No later than March 1 following each calendar year: Results of the evaluations of ground-water surface elevations under §265.93(f), and a description of the response to that evaluation, where applicable.	Section 3.5 Appendix A in CPCC-00417, Sections A2.5 and A3.8

Notes: Complete reference citations are provided in Chapter 5.

In accordance with WAC 173-303-400(3)(b), "Dangerous Waste Regulations," "Interim Status Facility Standards," for the purposes of applying the interim status standards of 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Subpart F, "Ground-Water Monitoring" the federal terms "Regional Administrator" means the "Department" and "Hazardous" means "Dangerous."

In accordance with Section I.A of WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit*, *Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste* (Hanford Facility RCRA Permit), this unit will continue to be considered an interim status unit until it is incorporated into Part III, V, or VI of the Hanford Facility RCRA Permit (or its successor) or until interim status is terminated. Therefore, groundwater monitoring continues under interim status requirements.

a. Regulatory requirements for interim status units, where no impact to groundwater has been identified, are found in WAC 173-303-400(3) and 40 CFR 265.90, "Applicability," through 40 CFR 265.94, "Recordkeeping and Reporting," which are applicable to this groundwater monitoring plan.

b. The parameters characterizing the suitability of the groundwater as a drinking water supply, as specified in 40 CFR 265, Appendix III, "EPA Interim Primary Drinking Water Standards," are conducted only during the first year of monitoring of a unit in accordance with 40 CFR 265.92(c)(1), "Sampling and Analysis." Because the first year of monitoring at this unit has been completed, Appendix III sampling is not applicable under this plan. New wells added to the monitoring network in this plan will be sampled for the constituents identified in Appendix 5 of Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*, for the first 1-year monitoring period to evaluate for any dangerous waste constituents or inadvertent impacts from the well drilling process (e.g., introduction of oil, grease, or other well construction materials used during drilling operations).

Sampling for supporting constituents (Table 1-3) is not required under 40 CFR 265 but provides additional information supporting data interpretation. Sampling will be performed to support charge balance calculation (alkalinity, anions [chloride, nitrate, and sulfate] and metals [calcium, magnesium, potassium, and sodium]); identify corrosion in stainless steel well casing (chromium, iron, manganese, molybdenum, and nickel); and provide information on water properties at the time of sampling (dissolved oxygen, temperature, and turbidity).

Table 1-3. Additional Monitoring Objectives

Monitoring Objective/Rationale	Supporting Constituents and Field Measurements*
Charge balance calculations	Alkalinity Anions (chloride, nitrate, and sulfate) Metals (calcium, magnesium, potassium, and sodium)
Monitoring for stainless steel well casing corrosion constituents	Metals (chromium, iron, manganese, molybdenum, and nickel)
Information on groundwater properties at the time of sampling	Field measurements (dissolved oxygen, temperature, and turbidity)

*Sampling for supporting constituents and field measurements is not required by WAC 173-303-400, "Dangerous Waste Regulations," "Interim Status Facility Standards," or 40 CFR 265, Subpart F, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," "Ground-Water Monitoring."

2 Groundwater Monitoring Program

This chapter describes the groundwater monitoring indicator evaluation program for the 216-A-36B Crib, consisting of parameters used as indicators of groundwater contamination, parameters establishing groundwater quality, supporting constituents, sampling frequency, monitoring well network, and sampling and analysis protocols. This chapter also summarizes the differences between this plan and the previous groundwater monitoring plan (DOE/RL-2010-93, Rev. 3).

2.1 Constituent List and Sampling Frequency

Table 2-1 presents the wells in the groundwater monitoring network, parameters and constituents to be analyzed, and the sampling frequency for monitoring of the 216-A-36B Crib. Parameters used as indicators of groundwater contamination (pH[1], specific conductance[1], total organic carbon [TOC], and total organic halogen [TOX]) will be sampled and analyzed semiannually (40 CFR 265.92(b)(3) and (d)(2), "Sampling and Analysis)," except for newly drilled replacement well 299-E17-58, which will require quarterly sampling and analysis during the first 1-year monitoring period. Parameters establishing groundwater quality (chloride, iron, manganese, phenols, sodium, and sulfate) will be sampled and analyzed annually (40 CFR 265.92(b)(2) and (d)(1)), except for the newly drilled well, which will require quarterly sampling and analysis for the first 1-year monitoring period. The specific phenols to be analyzed as groundwater quality parameters are identified in Table 2-2.

Although not required to be collected under 40 CFR 265, supporting constituents (Table 1-3) will be sampled and analyzed semiannually to support interpretation of the required groundwater monitoring results and monitor the condition of the network wells[2]. Well 299-E17-58 will be sampled quarterly for supporting constituents for the first 1-year monitoring period, after which sampling will be performed semiannually.

Supporting constituents are collected as follows:

- Charge balance calculation: alkalinity, anions (chloride, nitrate, and sulfate), and metals (calcium, magnesium, potassium, and sodium)
- Well casing corrosion constituents: chromium, iron, manganese, molybdenum, and nickel
- Field measurements to provide information on water properties: dissolved oxygen, temperature, and turbidity

[1] pH and specific conductance are collected as field measurements.

[2] Some supporting constituents (chloride, iron, manganese, sodium, and sulfate) that are needed to support interpretation of groundwater conditions are also required to be collected as groundwater quality parameters under 40 CFR 265.92(b)(2). The remaining supporting constituents are not required or subject to requirements under 40 CFR 265.

Table 2-1. Monitoring Well Network and Sample Schedule for the 216-A-36B Crib

Well Name	Purpose	WAC Compliant	RCRA-Required Parameters[a]											Supporting Constituents[b]				Table 2-3 Constituents[g]
			Water Level	Contamination Indicator Parameters				Groundwater Quality Parameters										
				pH	Specific Conductance	Total Organic Carbon	Total Organic Halogen	Chloride	Iron	Manganese	Phenols[c]	Sodium	Sulfate	Alkalinity	Anions[d]	Field Measurements[e]	Metals[f]	
299-E17-1[h]	Upgradient	N	E	S4	S4	S4	S4	A	A	A	A	A	A	S	S	S	S	N/A
299-E17-19	Upgradient	Y	E	S4	S4	S4	S4	A	A	A	A	A	A	S	S	S	S	N/A
299-E17-58 (replacement for 299-E17-1)	Upgradient	Y	E	Q4/S4	Q4/S4	Q4/S4	Q4/S4	Q/A	Q/A	Q/A	Q/A	Q/A	Q/A	Q/S	Q/S	Q/S	Q/S	Q
299-E17-14	Downgradient	Y	E	S4	S4	S4	S4	A	A	A	A	A	A	S	S	S	S	N/A
299-E17-15	Downgradient	Y	E	S4	S4	S4	S4	A	A	A	A	A	A	S	S	S	S	N/A
299-E17-16	Downgradient	Y	E	S4	S4	S4	S4	A	A	A	A	A	A	S	S	S	S	N/A
299-E17-18	Downgradient	Y	E	S4	S4	S4	S4	A	A	A	A	A	A	S	S	S	S	N/A

Notes: The contamination indicator parameters pH and specific conductance are collected as field measurements.

Samples for metals that are analyzed by either method 6010 or 6020 in Table A-3 of CPCC-00417, *Quality Assurance Project Plan and Sampling Protocol for Interim Status Groundwater Monitoring Plans*, will be collected as both filtered and unfiltered samples.

a. Parameters are required by 40 CFR 265.92, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," "Sampling and Analysis."

b. Supporting constituents specified in Table 1-3 are used to support interpretation of the required groundwater monitoring results and provide a better understanding of the potential condition of the network wells. Some constituents (chloride, iron, manganese, sodium, and sulfate) are also collected as groundwater quality parameters, and are subject to collection requirements under 40 CFR 265.92. The remaining supporting constituents are not required, or subject to requirements, under 40 CFR 265. Supporting constituents will be sampled semiannually.

Table 2-1. Monitoring Well Network and Sample Schedule for the 216-A-36B Crib

Well Name	Purpose	WAC Compliant	RCRA-Required Parameters[a]												Supporting Constituents[b]				Table 2-3 Constituents[g]
				Contamination Indicator Parameters				Groundwater Quality Parameters											
			Water Level	pH	Specific Conductance	Total Organic Carbon	Total Organic Halogen	Chloride	Iron	Manganese	Phenols[c]	Sodium	Sulfate	Alkalinity	Anions[d]	Field Measurements[e]	Metals[f]	
299-E17-58	Replacement for 299-E17-1	Y	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4
299-E17-59	Upgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-60	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-61	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-62	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-63	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-64	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-65	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-66	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-67	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-68	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-69	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-70	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-71	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-72	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-73	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-74	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-75	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-76	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-77	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-78	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-79	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-80	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-81	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-82	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-83	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-84	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-85	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-86	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-87	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-88	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-89	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-90	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-91	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-92	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-93	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-94	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-95	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-96	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-97	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-98	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-99	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-100	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-101	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-102	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-103	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-104	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-105	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-106	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-107	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-108	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-109	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-110	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-111	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-112	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-113	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-114	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-115	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-116	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-117	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-118	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-119	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-120	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-121	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-122	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-123	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-124	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-125	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-126	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-127	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-128	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-129	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-130	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-131	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-132	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-133	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-134	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-135	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-136	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-137	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-138	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-139	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-140	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-141	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-142	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-143	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-144	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-145	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-146	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-147	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-148	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-149	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-150	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-151	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-152	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-153	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-154	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-155	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-156	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-157	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-158	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-159	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-160	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-161	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-162	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-163	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-164	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-165	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-166	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-167	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-168	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-169	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-170	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-171	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-172	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-173	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-174	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-175	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-176	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-177	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-178	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-179	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-180	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-181	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-182	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-183	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-184	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-185	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-186	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-187	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-188	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-189	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-190	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-191	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-192	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-193	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-194	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-195	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-196	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-197	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-198	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-199	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-200	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-201	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-202	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-203	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-204	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-205	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-206	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-207	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-208	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-209	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-210	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-211	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-212	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-213	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-214	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-215	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-216	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-217	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-218	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-219	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-220	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-221	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-222	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-223	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-224	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-225	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-226	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-227	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-228	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-229	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-230	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-231	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-232	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-233	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-234	Downgradient	Y	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4	S4
299-E17-235	Downgradient	Y	S4	S4	S4	S4	S4

Table 2-2. Phenols Analyzed as Groundwater Quality Constituents

Constituent	CAS Number
2-Chlorophenol	95-57-8
2-Methylphenol (o-Cresol)	95-48-7
2-Nitrophenol (o-Nitrophenol)	88-75-5
2,3,4,6-Tetrachlorophenol	58-90-2
2,4-Dichlorophenol	120-83-2
2,4-Dimethylphenol (2,4-Xylenol)	105-67-9
2,4-Dinitrophenol	51-28-5
2,4,5-Trichlorophenol	95-95-4
2,4,6-Trichlorophenol	88-06-2
2,6-Dichlorophenol	87-65-0
3-Methylphenol (m-Cresol)	108-39-4*
4-Chloro-3-methylphenol (p-Chloro-m-cresol)	59-50-7
4-Methylphenol (p-Cresol)	106-44-5*
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methyl phenol)	534-52-1
Dinoseb (2-sec-Butyl-4,6-dinitrophenol)	88-85-7
p-Nitrophenol (4-Nitrophenol)	100-02-7
Pentachlorophenol	87-86-5
Phenol	108-95-2

Note: This table provides the specific phenols to be included for analysis as groundwater quality parameters under this monitoring plan.

*Analyzed and reported as 3 & 4 methylphenol (CAS number 65794-96-9).

CAS = Chemical Abstracts Service

Replacement well 299-E17-58 was drilled to replace existing upgradient well 299-E17-1, which is not constructed to the standards in WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells." Well 299-E17-58 will be sampled quarterly for the constituents identified in Appendix 5 of Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100* (Table 2-3), for the first 1-year monitoring period to evaluate for any

dangerous waste constituents or inadvertent impacts from the well drilling and construction process (e.g., introduction of oil, grease, or other well construction materials used during drilling operations). This 1-year monitoring period will be performed concurrently with monitoring for indicator parameters, groundwater quality parameters, and supporting constituents; after which, Appendix 5 constituents will no longer be sampled. However, at the discretion of DOE, monitoring for constituents identified in Appendix 5 of Ecology Publication No. 97-407 (or a subset of the constituents) may be continued beyond 1 year if deemed necessary.

New and replacement wells are monitored quarterly for the first year to obtain background sampling information and evaluate for any dangerous waste constituents or inadvertent impacts from the well drilling process. Well 299-E17-58 is replacing well 299-E17-1, which is upgradient of the unit. One year of background sampling for the replacement upgradient well is needed to obtain sufficient data to update critical mean values; therefore, sampling of existing well 299-E17-1 will continue until background sampling for replacement well 299-E17-58 is complete. After well 299-E17-58 has completed its first year of monitoring, well 299-E17-1 will be removed from the network and no longer sampled under this plan.

In the event that the well network is modified and a new or existing well[3] is added to the network, any such well will be sampled quarterly for the constituents identified in Appendix 5 of Ecology Publication No. 97-407 (Table 2-3) during the first 1-year monitoring period to evaluate for any dangerous waste constituents.

Consistent with the requirements of 40 CFR 265.92(e), water-level measurements at each monitoring well will be collected at each sampling event.

CPCC-00417 provides the QAPjP and the analytical methods for the sampling constituents and sampling protocols for interim status monitoring plans. CPCC-00417 will be revised as needed to provide updated information and the most current revision is to be used with this monitoring plan[4]. The analytical methods associated with the 216-A-36B Crib sampling constituents are provided in Table A-3 of CPCC-00417. Samples for metals that are identified as analyzed by either method 6010 or 6020 in Table A-3 of CPCC-00417 will be collected as both filtered and unfiltered samples.

Table 2-3. Appendix 5 of Ecology Publication No. 97-407 Constituents

Constituent	CAS Number	Constituent	CAS Number
Inorganic Constituents			
Antimony	7440-36-0	Mercury	7439-97-6
Arsenic	7440-38-2	Nickel	7440-02-0
Barium	7440-39-3	Selenium	7782-49-2
Beryllium	7440-41-7	Silver	7440-22-4
Cadmium	7440-43-9	Sulfide	18496-25-8
Chromium	7440-47-3	Thallium	7440-28-0
Cobalt	7440-48-4	Tin	7440-31-5

[3] "Existing well" refers to any well that is already installed and was not drilled specifically for this monitoring network.

[4] For the assessment of data usability that is provided in the QAPjP, the previous version(s) of CPCC-00417 in effect during the period under assessment may need to be used.

Table 2-3. Appendix 5 of Ecology Publication No. 97-407 Constituents

Constituent	CAS Number	Constituent	CAS Number
Copper	7440-50-8	Vanadium	7440-62-2
Cyanide (total and free)	57-12-5	Zinc	7440-66-6
Lead	7439-92-1	--	--
Volatile Organic Compounds			
1,1-Dichloroethane	75-34-3	Carbon tetrachloride	56-23-5
1,1-Dichloroethene (1,1-Dichloroethylene)	75-35-4	Chlorobenzene	108-90-7
1,1,1-Trichloroethane	71-55-6	Chloroethane	75-00-3
1,1,1,2-Tetrachloroethane	630-20-6	Chloroform	67-66-3
1,1,2-Trichloroethane	79-00-5	Chloroprene	126-99-8
1,1,2,2-Tetrachloroethane	79-34-5	Dibromochloromethane	124-48-1
1,2-Dibromo-3-chloropropane	96-12-8	p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7
1,2-Dibromoethane	106-93-4	Dichlorodifluoromethane	75-71-8
1,2-Dichloroethane	107-06-2	Ethylbenzene	100-41-4
1,2-Dichloropropane	78-87-5	Ethyl methacrylate	97-63-2
trans-1,2-Dichloroethylene	156-60-5	Isobutanol (Isobutyl alcohol)	78-83-1
1,2,3-Trichloropropane	96-18-4	Methacrylonitrile	126-98-7
cis-1,3-Dichloropropene	10061-01-5	Methyl bromide (Bromomethane)	74-83-9
trans-1,3-Dichloropropene	10061-02-6	Methyl chloride (Chloromethane)	74-87-3
trans-1,4-Dichloro-2-butene	110-57-6	Methyl iodide (Iodomethane)	74-88-4
2-Butanone (Methyl ethyl ketone; MEK)	78-93-3	Methyl methacrylate	80-62-6
2-Propanone (Acetone)	67-64-1	Methylene bromide (Dibromomethane)	74-95-3
2-Hexanone (Methyl butyl ketone)	591-78-6	Methylene chloride	75-09-2
4-Methyl-2-pentanone (Methyl isobutyl ketone)	108-10-1	Propionitrile (Ethyl cyanide)	107-12-0
Acetonitrile (Methyl cyanide)	75-05-8	Styrene	100-42-5
Acrolein	107-02-8	Tetrachloroethene	127-18-4
Acrylonitrile	107-13-1	Toluene	108-88-3
Allyl chloride	107-05-1	Trichloroethene (TCE)	79-01-6
Benzene	71-43-2	Trichlorofluoromethane	75-69-4
Bromodichloromethane	75-27-4	Vinyl acetate	108-05-4

Table 2-3. Appendix 5 of Ecology Publication No. 97-407 Constituents

Constituent	CAS Number	Constituent	CAS Number
Bromoform	75-25-2	Vinyl chloride (Chloroethene)	75-01-4
Carbon disulfide	75-15-0	Xylenes (total) (mixed isomers)	1330-20-7
Semivolatile Organic Compounds			
1-Naphthylamine	134-32-7	Dibenzofuran	132-64-9
1,2-Dichlorobenzene (o-Dichlorobenzene)	95-50-1	m-Dichlorobenzene (1,3-Dichlorobenzene)	541-73-1
1,2,4-Trichlorobenzene	120-82-1	Diethyl phthalate	84-66-2
1,2,4,5-Tetrachlorobenzene	95-94-3	O,O-Diethyl O-2-pyrazinyl phosphorothioate	297-97-2
1,4-Dioxane	123-91-1	p-(Dimethylamino)azobenzene	60-11-7
1,4-Naphthoquinone	130-15-4	alpha, alpha-Dimethylphenethylamine	122-09-8
2-Acetylaminofluorene	53-96-3	Dimethyl phthalate	131-11-3
2-Chloronaphthalene	91-58-7	Di-n-butyl phthalate	84-74-2
2-Chlorophenol	95-57-8	m-Dinitrobenzene	99-65-0
2-Methylphenol (o-Cresol)	95-48-7	Di-n-octylphthalate	117-84-0
2-Methylnaphthalene	91-57-6	Diphenylamine	122-39-4
2-Naphthylamine	91-59-8	Ethyl methanesulfonate	62-50-0
2-Nitrophenol (o-Nitrophenol)	88-75-5	Fluoranthene	206-44-0
2-Picoline	109-06-8	9H-Fluorene (Fluorene)	86-73-7
2,3,4,6-Tetrachlorophenol	58-90-2	Hexachlorobenzene	118-74-1
2,4-Dichlorophenol	120-83-2	Hexachlorobutadiene	87-68-3
2,4-Dimethylphenol	105-67-9	Hexachlorocyclopentadiene	77-47-4
2,4-Dinitrophenol	51-28-5	Hexachloroethane	67-72-1
2,4-Dinitrotoluene	121-14-2	Hexachlorophene	70-30-4
2,4,5-Trichlorophenol	95-95-4	Hexachloropropene	1888-71-7
2,4,6-Trichlorophenol	88-06-2	Indeno(1,2,3-cd)pyrene	193-39-5
2,6-Dichlorophenol	87-65-0	Isophorone	78-59-1
2,6-Dinitrotoluene	606-20-2	Isosafrole	120-58-1
3-Methylcholanthrene	56-49-5	Methapyrilene	91-80-5
3-Methylphenol (m-Cresol)	108-39-4	Methyl methanesulfonate	66-27-3
4-Methylphenol (p-Cresol)	106-44-5	Naphthalene	91-20-3
3,3′-Dichlorobenzidine	91-94-1	Nitrobenzene	98-95-3
3,3′-Dimethylbenzidine	119-93-7	o-Nitroaniline (2-Nitroaniline)	88-74-4
4-Aminobiphenyl	92-67-1	m-Nitroaniline (3-Nitroaniline)	99-09-2

Table 2-3. Appendix 5 of Ecology Publication No. 97-407 Constituents

Constituent	CAS Number	Constituent	CAS Number
4-Bromophenyl phenyl ether	101-55-3	p-Nitroaniline (4-Nitroaniline)	100-01-6
4-Chloro-3-methylphenol (p-Chloro-m-cresol)	59-50-7	p-Nitrophenol (4-Nitrophenol)	100-02-7
4-Chlorophenyl phenyl ether	7005-72-3	n-Nitrosodi-n-butylamine	924-16-3
4-Nitroquinoline 1-oxide	56-57-5	n-Nitrosodiethylamine	55-18-5
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methyl phenol)	534-52-1	n-Nitrosodimethylamine	62-75-9
5-Nitro-o-toluidine	99-55-8	n-Nitrosodiphenylamine	86-30-6
7,12-Dimethylbenz[a]anthracene	57-97-6	n-Nitroso-di-n-dipropylamine (n-Nitrosodipropylamine; Di-n-propylnitrosamine)	621-64-7
Acenaphthene	83-32-9	n-Nitrosomethylethalamine	10595-95-6
Acenaphthylene	208-96-8	n-Nitrosomorpholine	59-89-2
Acetophenone	98-86-2	n-Nitrosopiperidine	100-75-4
Aniline	62-53-3	n-Nitrosopyrrolidine	930-55-2
Anthracene	120-12-7	Pentachlorobenzene	608-93-5
Aramite	140-57-8	Pentachloroethane	76-01-7
Benz[a]anthracene (Benzo[a]anthracene)	56-55-3	Pentachloronitrobenzene	82-68-8
Benz[e]acephenanthrylene (Benzo[b]fluoranthene)	205-99-2	Pentachlorophenol	87-86-5
Benzo[k]fluoranthene	207-08-9	Phenacetin	62-44-2
Benzo[ghi]perylene	191-24-2	Phenanthrene	85-01-8
Benzo[a]pyrene	50-32-8	Phenol	108-95-2
Benzyl alcohol	100-51-6	p-Phenylenediamine	106-50-3
Bis(2-chloroethoxy)methane	111-91-1	Pyrene	129-00-0
Bis(2-chloroethyl)ether	111-44-4	Pyridine	110-86-1
Bis(2-chloro-1-methylethyl) ether (2,2'-Oxybis(1-chloropropane))	108-60-1	Safrole	94-59-7
Bis(2-ethylhexyl) phthalate	117-81-7	Tetraethyl dithiopyrophosphate	3689-24-5
Butylbenzylphthalate	85-68-7	o-Toluidine	95-53-4
p-Chloroaniline (4-Chloroaniline)	106-47-8	O,O,O-Triethyl phosphorothioate	126-68-1
Chrysene	218-01-9	sym-Trinitrobenzene	99-35-4
Dibenz[a,h]anthracene	53-70-3	--	--

Table 2-3. Appendix 5 of Ecology Publication No. 97-407 Constituents

Constituent	CAS Number	Constituent	CAS Number
Herbicides			
2,4-D; 2,4-Dichlorophenoxyacetic acid	94-75-7	Dinoseb (2-sec-Butyl-4,6-dinitrophenol)	88-85-7
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid	93-76-5	Pronamide	23950-58-5
Diallate	2303-16-4	Silvex; 2,4,5-TP	93-72-1
Pesticides			
4,4′-DDD	72-54-8	Endosulfan II	33213-65-9
4,4′-DDE	72-55-9	Endosulfan sulfate	1031-07-8
4,4′-DDT	50-29-3	Endrin	72-20-8
Aldrin	309-00-2	Endrin aldehyde	7421-93-4
alpha-BHC	319-84-6	Famphur	52-85-7
beta-BHC	319-85-7	Heptachlor	76-44-8
delta-BHC	319-86-8	Heptachlor epoxide	1024-57-3
gamma-BHC (Lindane)	58-89-9	Isodrin	465-73-6
Chlordane	57-74-9	Kepone	143-50-0
Chlorobenzilate	510-15-6	Methoxychlor	72-43-5
Dieldrin	60-57-1	Methyl parathion	298-00-0
Dimethoate	60-51-5	Parathion	56-38-2
Disulfoton	298-04-4	Phorate	298-02-2
Endosulfan I	959-98-8	Toxaphene	8001-35-2
Polychlorinated Biphenyls			
Aroclor 1016	12674-11-2	Aroclor 1248	12672-29-6
Aroclor 1221	11104-28-2	Aroclor 1254	11097-69-1
Aroclor 1232	11141-16-5	Aroclor 1260	11096-82-5
Aroclor 1242	53469-21-9	--	--
Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans			
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	Pentachlorodibenzofurans	30402-15-4
Hexachlorodibenzo-p-dioxins	34465-46-8	Tetrachlorodibenzo-p-dioxins	41903-57-5
Hexachlorodibenzofurans	55684-94-1	Tetrachlordibenzofurans	55722-27-5
Pentachlorodibenzo-p-dioxins	36088-22-9	--	--

Note: This table identifies the constituents in Appendix 5 of Ecology Publication No. 97-407, *Chemical Test Methods for Designating Dangerous Waste WAC 173-303-090 & -100.*

CAS = Chemical Abstracts Service

2.1.1 Sample Schedule Impacts from Well Maintenance and Sampling Logistics

Well maintenance (e.g., pump repairs, periodic well cleaning, and redevelopment) and sampling logistics resulting from multiple factors including environmental (e.g., inclement weather) and access restrictions (e.g., heightened fire danger, area access restriction due to work by other Hanford Site contractors such as in the tank farms) sometimes delay scheduled sampling events. Sampling events are scheduled by month. The Field Work Supervisor (FWS) determines the sampling schedule for a well within a given month. If a well cannot be sampled at the times determined by the FWS, then the FWS and Sample Management and Reporting group, along with the project scientist, consult to determine how best to recover or reschedule the sampling event as close to the original sampling date as possible. If it is observed during the presampling walkdown that one or more network wells cannot be sampled, sampling of the well network will not begin and management will be notified. Depending on the situation, the network sampling is rescheduled as soon as feasible to meet the schedule set forth in this plan. In some cases, it may not be obvious that sampling cannot be performed until a well is accessed (e.g., an issue with a pump).

Missed sampling events that are not rescheduled within the same month are given top priority when scheduling sampling for the following month. In the event that a sampling delay has occurred and the representativeness of the samples is in question, DOE and Ecology may agree to resampling wells. DOE will provide informal notification to Ecology if sampling of the network is delayed past the end of the sampling period (e.g., quarterly, semiannual). Informal notification will be made within 4 weeks of the end of the sampling period. Ecology may provide input in a timely fashion to DOE on how to proceed. Missed or cancelled sampling events are reported to DOE and are documented in the annual Hanford Site RCRA groundwater monitoring report (e.g., DOE/RL-2021-50, *Hanford Site RCRA Groundwater Monitoring Report for 2021*).

2.1.2 Well Biofouling and Total Organic Carbon Results

Biofouling of wells can result in collection of nonrepresentative groundwater samples and produce nonrepresentative analytical results for TOC. In Hanford Site wells, biofouling is often associated with iron and manganese-oxidizing bacteria. The bacterial growths are physically manifested as slime or as filamentous or flocculent accumulations. The accumulations frequently occur in the screened interval and exhibit discrete coloration (e.g., rusty orange in the case of iron-oxidizing bacteria or black in the case of manganese-oxidizing bacteria).

TOC is a nonspecific analysis that is used as an indicator of the possible presence of regulated organic compounds in groundwater. TOC represents organic compounds in the sample including dissolved organic compounds as well as suspended organic particles that may be present in an unfiltered sample. Suspended organic materials in groundwater samples can include microbial biomass associated with well biofouling. Furthermore, the TOC measurement is subject to positive interference if suspended organic material (e.g., microbial biomass) or dissolved naturally occurring organic compounds (e.g., humic and fulvic acids) are present in the sample.

If elevated concentrations of TOC are measured within a well (particularly, if a TOC concentration above the critical mean[5] is encountered), well maintenance will be contacted and appropriate follow-up activities will be defined to address any accumulated microbiological growth in the well. Well maintenance activities are designed to reduce the impact of biomass transfer from the well and generation of a resultant high TOC value. Well maintenance may include cleaning/rehabilitation of the well to ensure

[5] The critical mean is a statistically determined background value that is calculated as specified under 40 CFR 265.93(b), "Preparation, Evaluation, and Response," and is used to determine if indicator parameters exhibit a significant increase (or pH decrease) in downgradient wells.

that the groundwater samples collected are representative of ambient groundwater conditions and not the result of sampling of biomass material present within the well. A downhole camera survey and well cleaning may be scheduled following receipt of an elevated TOC result where biofouling of the well is suspected. Subsequent to well maintenance activities, a well having an exceedance of the critical mean for TOC will be sampled for confirmational laboratory split samples as required under 40 CFR 265.93(c)(2), "Preparation, Evaluation, and Response."

2.1.3 Well Casing Corrosion

Groundwater chemistry is routinely reviewed and evaluated. If the groundwater chemistry data for a well demonstrate a consistent upward trend over time for stainless steel corrosion constituents (chromium, iron, manganese, molybdenum, and nickel) in proportionate concentrations as found in stainless steel, it may be an indicator of corrosion. These data are used to provide a better understanding of the potential condition of the network wells.

2.2 Monitoring Well Network

The groundwater well network identified for interim status monitoring of the 216-A-36B Crib is the same as that proposed for final status monitoring in Section 9.3 in SGW-60595, which comprises two upgradient wells and four downgradient wells to monitor for potential releases to the water table from the 216-A-36B Crib (Figure 2-1). The network wells were selected through the methodology presented in Chapters 5 through 7 of SGW-60595, based on known groundwater conditions. The groundwater flow direction at the 216-A-36B Crib is to the east-southeast (Section 2.2 in DOE/RL-2021-50). Specific details regarding the selection of the well locations is presented in Sections 9.3.1 through 9.3.6 of SGW-60595. Information on the wells comprising the network is summarized in Table 2-4.

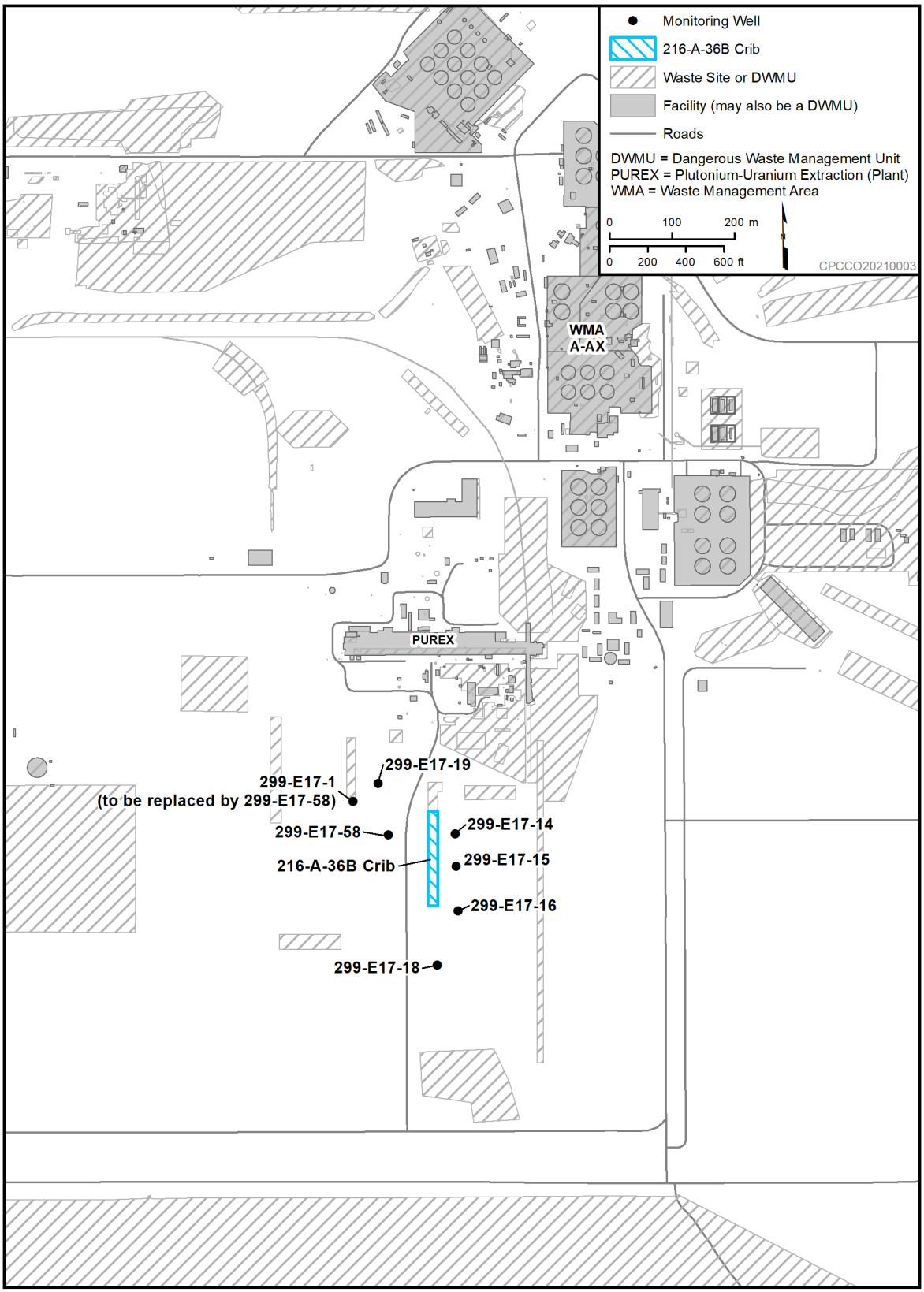

Figure 2-1. 216-A-36B Crib Monitoring Well Network

Table 2-4. Attributes for Wells in the 216-A-36B Crib Groundwater Monitoring Network

Well Name	Completion Date	Easting (m)[a]	Northing (m)[a]	Top of Casing Elevation (m [ft]) (NAVD88)	Water Table Elevation (m [ft])	Depth of Water in Screen (m [ft])	Water-Level Date
299-E17-1[b]	12/28/1955	574977.08	135386.15	220.31 (722.81)	121.36 (398.16)	1.2 (3.8)	7/11/2022
299-E17-14	5/19/1988	575140.61	135333.74	221.23 (725.81)	121.48 (398.57)	1.8 (5.9)	7/6/2022
299-E17-15	5/16/1988	575142.78	135282.05	221.10 (725.41)	121.21 (397.67)	1.6 (5.3)	7/6/2022
299-E17-16	5/16/1988	575145.77	135210.78	220.74 (724.21)	121.40 (398.30)	2.1 (6.9)	7/6/2022
299-E17-18	5/16/1988	575112.43	135123.59	220.76 (724.27)	121.48 (398.54)	2.0 (6.6)	7/6/2022
299-E17-19	9/19/1988	575017.18	135414.87	220.36 (722.96)	121.29 (397.93)	0.7 (2.3)	7/6/2022
299-E17-58 (replacement well for 299-E17-1)	2/17/2022	575033.43	135332.33	220.67 (723.99)	121.48 (398.56)	5.8 (19.1)	7/18/2022

Reference: NAVD88, *North American Vertical Datum of 1988.*

a. Coordinates are in Washington State Plane (south zone), NAD83, *North American Datum of 1983*; 1991 adjustment.

b. Well is not compliant with the construction standards in WAC 173-160, "Minimum Standard for Construction and Maintenance of Wells," and replacement well 299-E17-58 was drilled. After well 299-E17-58 has completed 1 year of sampling, well 299-E17-1 will be removed from the network and no longer sampled under this plan.

The upgradient monitoring network proposed in SGW-60595 includes two existing wells (299-E17-1 and 299-E17-19). Well 299-E17-1 is not compliant with the construction standards of WAC 173-160 and replacement well 299-E17-58 was drilled in 2022. As provided in Section 2.1, well 299-E17-1 will continue to be sampled until the replacement well 299-E17-58 has completed its first year of monitoring; after which well 299-E17-1 will be removed from the network and no longer monitored under this plan. Upgradient well 299-E17-19 is going dry and will be added to the list of wells for future replacement in the Tri-Party Agreement Milestone M-24-00 (Ecology et al., 1989).

If a well is within approximately 2 years of going dry, a replacement well is proposed; such wells that are proposed for installation at the Hanford Site are negotiated annually by Ecology, DOE, and EPA under Tri-Party Agreement Milestone M-24-00 (Ecology et al., 1989).

Construction details and pertinent information for the wells are provided in Appendix A.

2.3 Differences Between this Plan and the Previous Plan

Table 2-5 identifies the main differences between this plan and the previous groundwater monitoring plan (DOE/RL-2010-93, Rev. 3).

Table 2-5. Main Differences Between this Monitoring Plan and the Previous Monitoring Plan

Type of Change	Previous Plan*	Current Plan	Justification Summary
Constituents	40 CFR 265 indicator parameters and groundwater quality parameters: included	Same	No change.
	Supporting constituents: alkalinity, anions (chloride, nitrate, and nitrite), metals (calcium, chromium, iron, manganese, magnesium, molybdenum, nickel, potassium, and sodium) for use in charge balance calculations and detection of well corrosion, and field measurements (dissolved oxygen, temperature, and turbidity)	Same	No change.
	Constituents identified in Appendix 5 of Ecology Publication No. 97-407: included at replacement well 299-E17-58	Same	No change.
Sampling frequency	40 CFR 265 indicator parameters: semiannually at existing wells and quarterly for the first 1-year of monitoring at replacement well 299-E17-58 40 CFR 265 groundwater quality parameters: annually at existing wells and quarterly for the first 1-year of monitoring at replacement well 299-E17-58	Same	No change.
	Supporting constituents: semiannually at existing wells and quarterly for the first 1-year of monitoring at replacement well 299-E17-58	Same	No change.

Table 2-5. Main Differences Between this Monitoring Plan and the Previous Monitoring Plan

Type of Change	Previous Plan*	Current Plan	Justification Summary
	Constituents identified in Appendix 5 of Ecology Publication No. 97-407: quarterly for 1 year at replacement well 299-E17-58	Same	No change.
Well network	Upgradient: 299-E17-1 (to be replaced by 299-E17-58) 299-E17-58 299-E17-19 Downgradient: 299-E17-14 299-E17-15 299-E17-16 299-E17-18	Same	Upgradient well 299-E17-1 is not compliant with the construction standards in WAC 173-160 and a replacement well 299-E17-58 was drilled.
Groundwater flow direction	East	East-southeast	Updated to align with 2021 flow interpretation.
Type of groundwater monitoring program	Indicator parameter monitoring	Same	No change.

Note: Complete reference citations are provided in Chapter 5.

* DOE/RL-2010-93, Rev. 3.

2.4 Sampling and Analysis Protocol

The groundwater protection regulations of WAC 173-303-400 dictate the groundwater sampling and analysis requirements applicable to interim status DWMUs. The QAPjP outlining the project management structure, data generation and acquisition, analytical procedures, and quality control is provided in Appendix A of CPCC-00417. Appendix B of CPCC-00417 provides the sampling protocols (e.g., sampling methods, sample handling and custody, management of waste, and health and safety considerations).

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3 Data Evaluation and Reporting

This chapter discusses the evaluation and interpretation of data.

3.1 Data Assessment

The data verification and data quality indicator evaluation tasks are discussed in the QAPjP (Appendix A in CPCC-00417).

3.2 Statistical Evaluation

The goal of the groundwater monitoring indicator evaluation program is to determine if the 216-A-36B Crib operations have affected groundwater quality beneath the DWMU based on the results of specified statistical tests. Under this plan, sampling activities and statistical evaluation methods are based on 40 CFR 265, Subpart F (incorporated by reference into WAC 173-303-400). These interim status regulations require the use of a statistical method that compares mean concentrations of the four general groundwater contamination indicator parameters (pH, specific conductance, TOC, and TOX) to background levels (critical means) to test for potential impact to groundwater. Each time a monitoring well is sampled, four replicate samples for TOC and TOX are collected, and four replicate field measurements are made for pH and specific conductance.

After the updated critical mean values are established, the basic procedure for statistical comparisons is as follows. Semiannually, the monitoring data from downgradient wells are compared to the upgradient (background) results for each of the four indicator parameters. The arithmetic mean and variance must be calculated based on at least four replicate measurements on each sample, for each well monitored, and then compared with the background arithmetic mean obtained (40 CFR 265.92(c)(2)) and updated as discussed in Chapter 5 of EPA 530/R-09-007, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance*. The comparison must consider each of the individual wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases (increases or decreases in the case of pH) over background (40 CFR 265.93(b) and Appendix IV, "Tests for Significance," to 40 CFR 265). Implementation of the statistical test method at the Hanford Site, including at the 216-A-36B Crib, is generally consistent with EPA 530/R-09-007. The background statistical analysis is updated annually to establish comparative values for indicator parameters. A rolling mean is used because of changing upgradient concentrations and groundwater flow conditions.

If a downgradient well comparison shows a significant increase (or pH increase or decrease), then the well is resampled. Split samples are sent to different laboratories to determine if the exceedance of the comparison value was the result of laboratory error.

If the exceedance of the statistical comparison value is confirmed by resampling, written notifications are made as detailed in Section 3.5 and in accordance with 40 CFR 265.93(d)(1).

3.3 Interpretation

Data are used to interpret groundwater conditions at the 216-A-36B Crib. Interpretive techniques may include the following:

- **Hydrographs:** Graph water levels versus time to determine decreases, increases, seasonal, or manmade fluctuations in groundwater levels.

- **Water table maps:** Use water-table elevations from multiple wells to construct contour maps and to estimate flow directions. Groundwater flow is assumed to be perpendicular to the potential lines on the maps. Water table maps may be used as the basis for estimating groundwater flow directions and hydraulic gradients by particle tracking calculations (e.g., ECF-HANFORD-21-0119, *Hydraulic Gradient and Average Linear Groundwater Velocity Calculations- Quarter 1 Calendar Year 2021*).
- **Trend plots:** Graph concentrations of constituents versus time to determine increases, decreases, and fluctuations. May be used in tandem with hydrographs and/or water table maps to determine if concentrations relate to changes in water level or groundwater flow directions.
- **Plume maps:** Map distributions of chemical constituent concentrations in the aquifer to determine the extent of contamination. Changes in plume distribution over time assist in determining plume movement and direction of groundwater flow.
- **Contaminant ratios:** Illustrate the relative abundances of contaminants from previously characterized Hanford Site-related processes and sources. Comparison of these ratios in groundwater can sometimes be used to distinguish among different sources of contamination (e.g., a specific process and its associated facility). Ratios may provide evidence of continuing source contamination, thereby linking contamination with a specific facility under monitoring. Evaluation of contaminant ratios in concentration trends may be used to demonstrate when facility-specific contamination no longer affects underlying groundwater.

3.4 Annual Determination of Monitoring Network

Groundwater monitoring requirements include an annual evaluation of the network to determine if it remains adequate to monitor the facility's impact on the quality of the groundwater in the uppermost aquifer underlying the facility (40 CFR 265.93(f)). The network must include at least one upgradient and at least three downgradient wells in the uppermost aquifer (40 CFR 265.91(a)(1) and (2), "Ground-Water Monitoring System").

The groundwater monitoring network will continue to be reevaluated annually to ensure that it is adequate to monitor any changing hydrogeologic conditions beneath the unit. If flow changes are observed, the 216-A-36B Crib contaminant migration conceptual model and geochemical trends will be reevaluated annually to determine the adequacy of the network and any necessary modifications required for the network. If a change in the groundwater flow direction occurs and the monitoring network is no longer aligned to the flow direction, then the monitoring network will be modified and a RCRA change notice or revised monitoring plan will be prepared.

Water-level measurements will continue to be collected during each sampling event. An additional and more comprehensive set of water-level measurements is made annually for selected wells on the Hanford Site; interpretation of these data are presented in the annual Hanford Site groundwater monitoring reports (e.g., DOE/RL-2020-60, *Hanford Site Groundwater Monitoring Report for 2020*).

3.5 Reporting and Notification

Groundwater monitoring and evaluation of groundwater surface elevation results are reported annually in accordance with the requirements of 40 CFR 265.94(a)(2). Reporting will be made in the annual Hanford Site RCRA groundwater monitoring report (e.g., DOE/RL-2021-50) by March 1.

If an upgradient well comparison shows a significant increase (or pH decrease) relative to the statistical comparison value, that information is also reported (40 CFR 265.93(c)(1)) in the annual Hanford Site RCRA groundwater monitoring report (e.g., DOE/RL-2021-50) by March 1.

If the exceedance of the statistical comparison value is confirmed, written notice is then provided to Ecology within 7 days (40 CFR 265.93(d)(1)) stating that the facility may be affecting groundwater quality. Within 15 days after the notification, a groundwater quality assessment program must be developed and placed in the facility operating record (40 CFR 265.93(d)(2)). This plan must be submitted to Ecology (WAC 173-303-400(3)(c)(v)(D)).

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4 Outline for Groundwater Quality Assessment Plan

If a groundwater contamination indicator parameter at a downgradient well significantly exceeds the background value or if pH decreases and is confirmed by verification sampling, a groundwater quality assessment plan will be prepared and submitted to Ecology, and the facility monitoring will be elevated to assessment monitoring status. The assessment program must be capable of determining whether dangerous waste or dangerous waste constituents from the facility have entered the groundwater, their rate and extent of migration, and their concentration.

This chapter presents a groundwater quality assessment monitoring plan outline required by 40 CFR 265.93(a). Information on the facility description, operational history, waste characteristics, geology and hydrogeology, groundwater monitoring history, and contaminant migration conceptual model are provided in the EER for groundwater monitoring associated with this unit, which will be referenced in the groundwater quality assessment monitoring plan. An outline for the assessment plan is presented in Table 4-1. Changes may be made to this outline as applicable.

Table 4-1. Suggested Groundwater Quality Assessment Plan Outline

Introduction
Regulatory Basis
Monitoring Objectives
Groundwater Monitoring
Constituent List and Sampling Frequency
Well Network
Sampling and Analysis Protocol
Data Evaluation and Reporting
Data Assessment
Data Evaluation
Interpretation
Annual Determination of Monitoring Network
Reporting and Recordkeeping
Implementation Schedule
References
Appendix A – Well Construction

Notes: Information on the facility description, operational history, waste characteristics, geology and hydrogeology, groundwater monitoring history, and contaminant migration conceptual model are provided in the engineering evaluation report for groundwater monitoring associated with this unit, which will be referenced in the groundwater quality assessment monitoring plan.

The quality assurance project plan and sampling protocol will be provided in CPCC-00417, *Quality Assurance Project Plan and Sampling Protocol for Interim Status Groundwater Monitoring Plans*.

Changes may be made to this outline, as applicable.

The groundwater quality assessment program may include the following elements:

- Description of the investigative approach for making first determination to decide if dangerous waste or dangerous waste constituents from the facility have entered the groundwater or if the exceedance was caused by other sources (false-positive rationale)
- Description of the approach to characterize rate and extent of contaminant migration
- Number, locations, and depths of wells in the monitoring network
- Sampling and analytical methods used
- Data evaluation methods
- An implementation schedule

The results of assessment determinations will be made as soon as technically feasible and a report of the findings will be sent to Ecology. The results of the groundwater quality assessment program will then be reported annually as required by 40 CFR 265.94(b).

5 References

10 CFR 962, "Byproduct Material," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/current/title-10/chapter-III/part-962.

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265.90, "Applicability."

265.91, "Ground-Water Monitoring System."

265.92, "Sampling and Analysis."

265.93, "Preparation, Evaluation, and Response."

265.94, "Recordkeeping and Reporting."

Appendix III, "EPA Interim Primary Drinking Water Standards."

Appendix IV, "Tests for Significance."

Subpart F, "Ground-Water Monitoring."

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Appendix A

Well Construction

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Tables

Table A-1. Hydrogeologic Monitoring Unit Classification Scheme A-1
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A1 Introduction

This appendix provides the following information for the existing 216-A-36B Crib groundwater monitoring wells:

- Well name
- Hydrogeologic unit monitored (the aquifer portion at the well screen-perforation) (Table A-1)
- The following sampling interval information, as provided in Table A-2:
  - Elevation at the top of the screen or perforated interval
  - Elevation at the bottom of the screen or perforated interval
  - Open interval length (i.e., difference between the top and bottom screen-perforation elevations)
  - Drilling method

Figures A-1 through A-7 provide construction and completion summaries for the existing network wells.

Table A-1. Hydrogeologic Monitoring Unit Classification Scheme

Unit	Description
TU	**Top of Unconfined.** Screened across the water table or the top of the open interval is within 1.5 m (5 ft) of the water table, and the bottom of the open interval is no more than 10.7 m (35 ft) below the water table.

Table A-2. Sampling Interval Information for Wells Within the 216-A-36B Crib Network

Well Name	Hydrogeologic Unit Monitored	Elevation Top of Open Interval (m [ft] NAVD88)	Elevation Bottom of Open Interval (m [ft] NAVD88)	Open Interval Length (m [ft])	Drilling Method
299-E17-1	TU	127.2 (417.4)	120.2 (394.5)	7.0 (22.9)	Cable tool
299-E17-14	TU	126.0 (413.2)	119.7 (392.6)	6.3 (20.6)	Cable tool
299-E17-15	TU	125.5 (411.8)	119.6 (392.3)	5.9 (19.5)	Cable tool
299-E17-16	TU	125.4 (411.4)	119.3 (391.4)	6.1 (20.0)	Cable tool
299-E17-18	TU	125.8 (412.6)	119.5 (392.0)	6.3 (20.6)	Cable tool
299-E17-19	TU	126.8 (416.0)	120.6 (395.6)	6.2 (20.4)	Cable tool
299-E17-58	TU	123.3 (404.5)	115.7 (379.5)	7.64 (25.1)	Sonic

Reference: NAVD88, *North American Vertical Datum of 1988*.

TU = Top of Unconfined

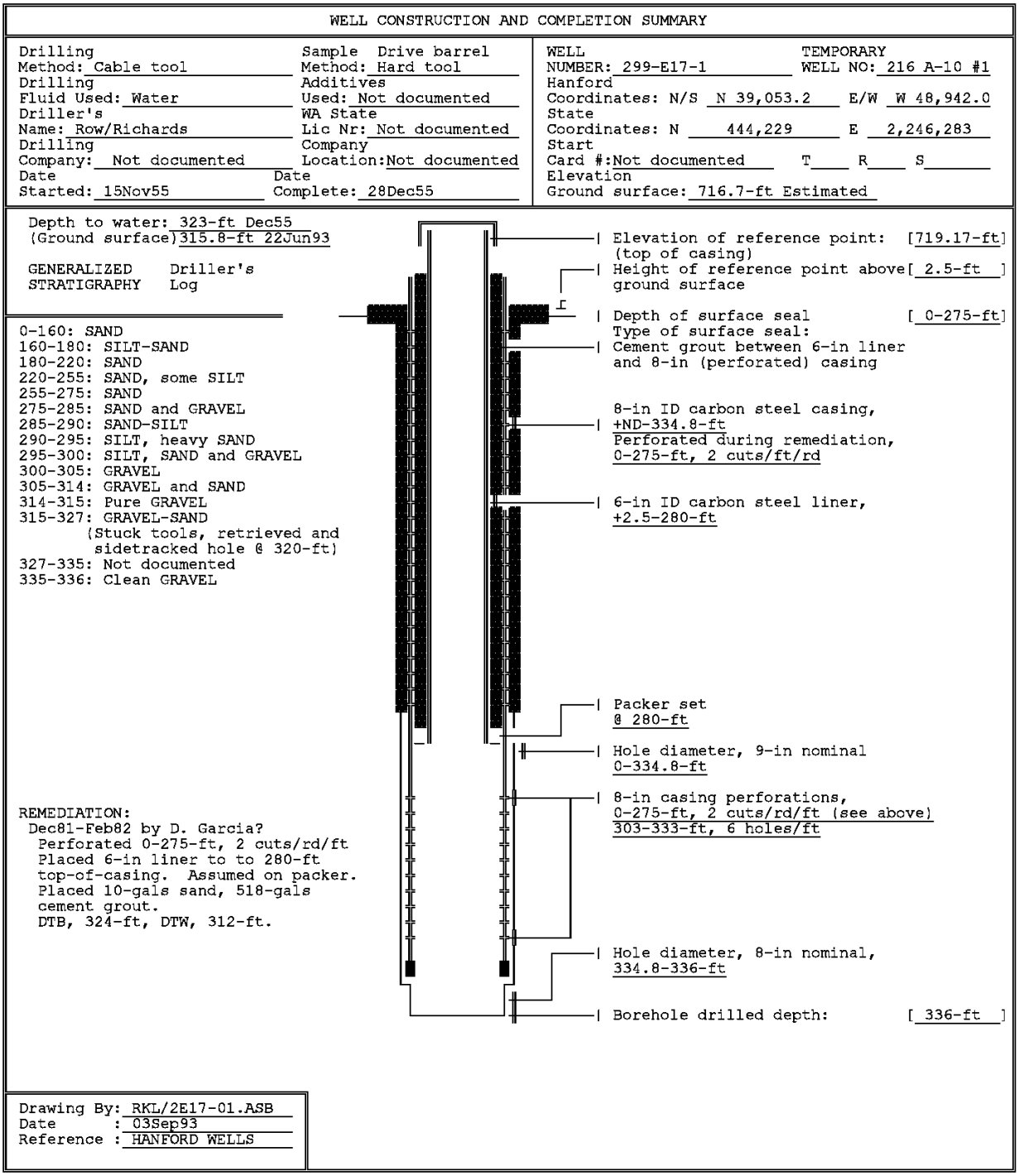

Figure A-1. Well 299-E17-1 Construction and Completion Summary (1 of 2)

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-1

WELL DESIGNATION	:	299-E17-1
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 39,053.2 W 48,942.05 [03Mar88-200East]
LAMBERT COORDINATES	:	N 444,229 E 2,246,283 [HANCONV]
DATE DRILLED	:	Dec55
DEPTH DRILLED (GS)	:	336-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	323-ft, Dec60; 315.4-ft, 22Jun93
CASING DIAMETER	:	8-in, carbon steel, +~2.0-334.8-ft 6-in, carbon steel, +2.5-280.0-ft
ELEV TOP CASING	:	719.17-ft, [03Mar88-200E]
ELEV GROUND SURFACE	:	716.7-ft, Estimated
PERFORATED INTERVAL	:	0-275 and 303-333-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 06Feb90, 6 and 8-in carbon steel casing. 2-ft concrete pad, no posts, capped and locked. ID stamped on brass cap in pad. Not in radiation zone. Hole in casing.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A-36 Crib quarterly water level measurement, 01May73-22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring, WHC ES&M RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Electric submersible
MAINTENANCE	:	

Figure A-1. Well 299-E17-1 Construction and Completion Summary (2 of 2)

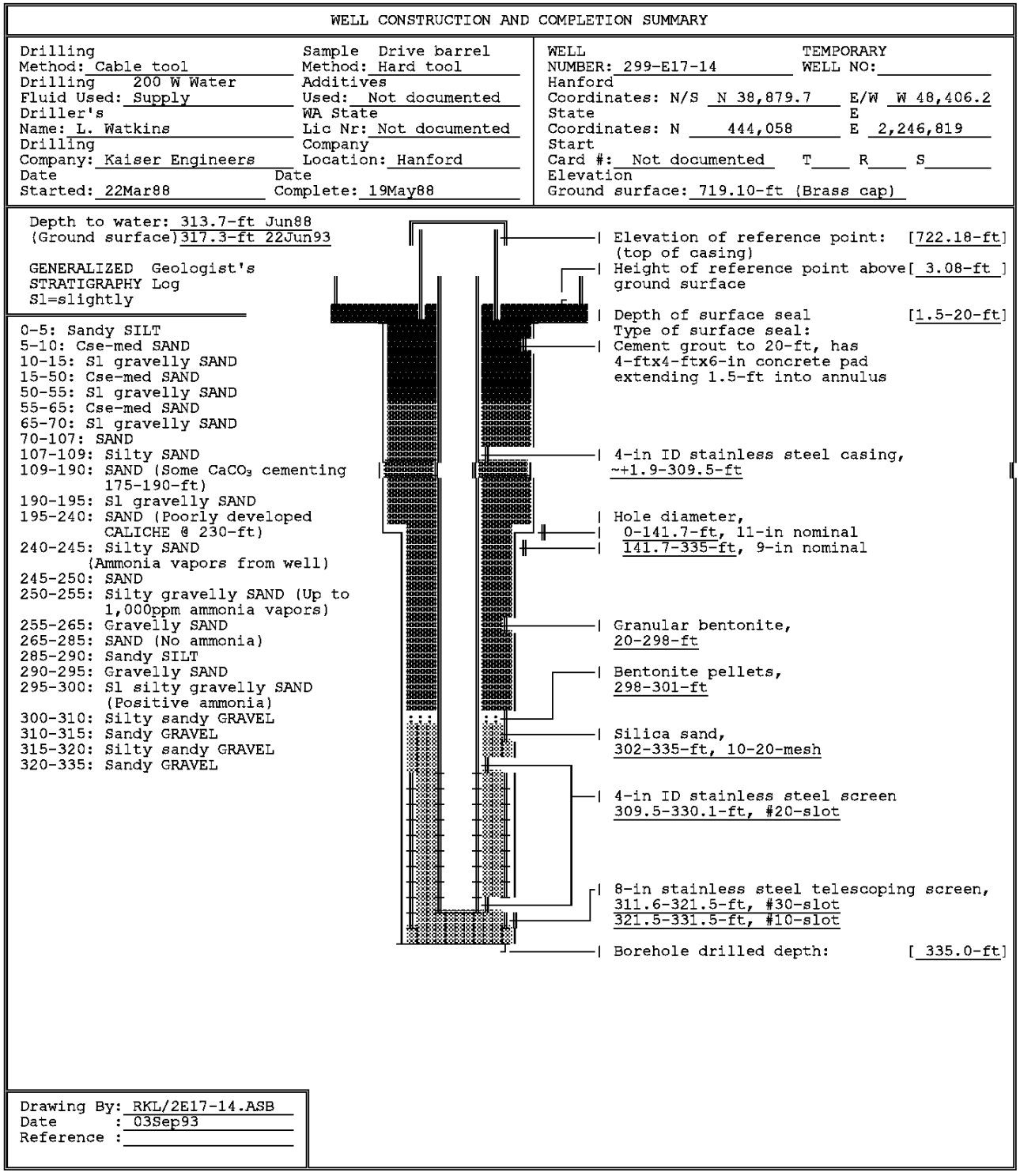

Figure A-2. Well 299-E17-14 Construction and Completion Summary (1 of 2)

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-14

WELL DESIGNATION	:	299-E17-14
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,879.7 W 48,406.2 [10Jun88-200E]
LAMBERT COORDINATES	:	N 444,058 E 2,246,819 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	335.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	313.7-ft, Jun88; 317.3-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ~+1.9-309.5-ft; 6-in stainless steel, +3.1-~0.5-ft
ELEV TOP CASING	:	722.18-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	719.10-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	309.5-330.1-ft, 4-in #20-slot stainless steel; 311.6-331.5-ft, 8-in telescoping, #10 and 30-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 quarterly water level measurement, 31May88-22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

Figure A-2. Well 299-E17-14 Construction and Completion Summary (2 of 2)

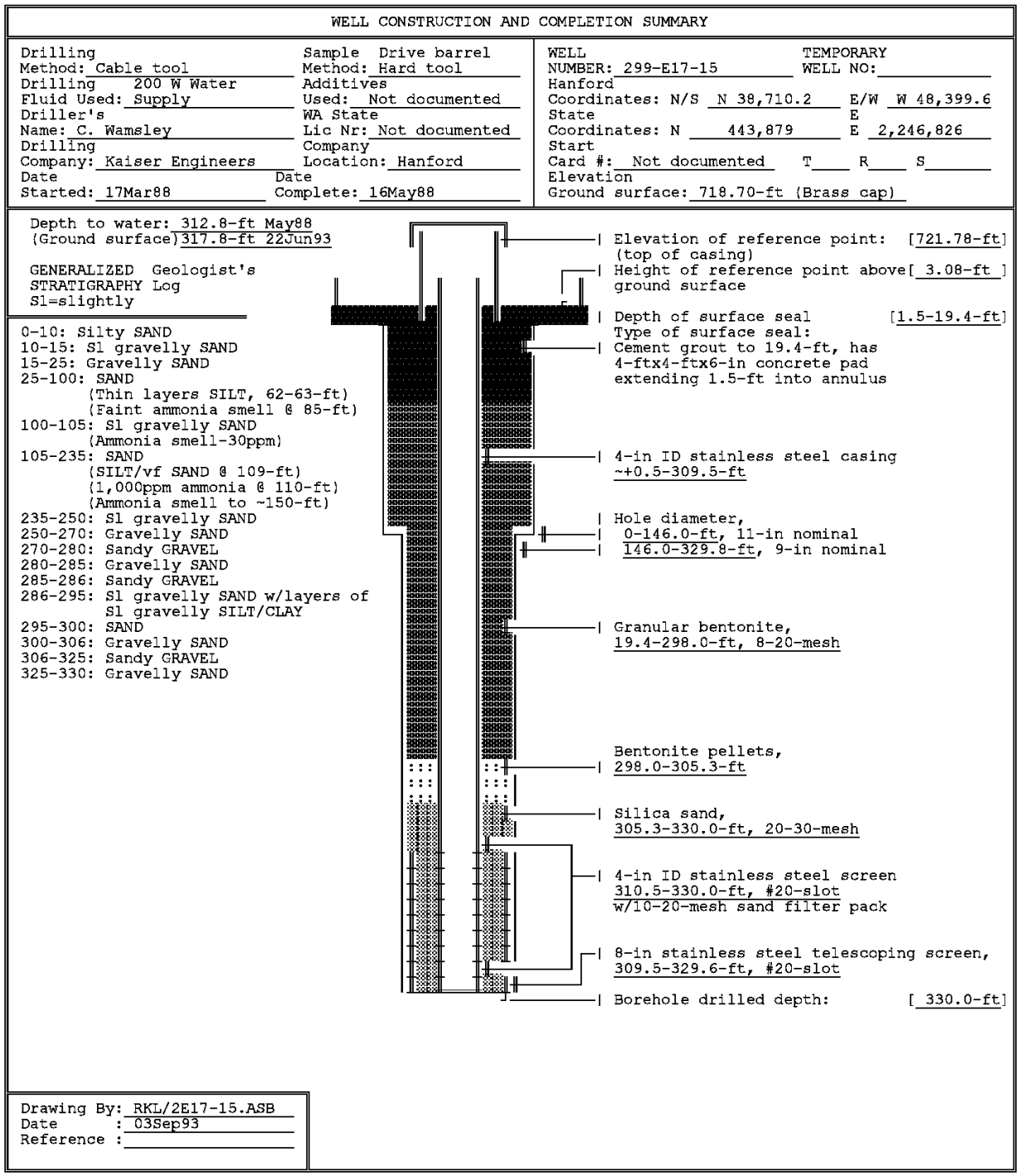

Figure A-3. Well 299-E17-15 Construction and Completion Summary (1 of 2)

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-15

WELL DESIGNATION	:	299-E17-15
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,710.2 W 48,399.6 [10Jun88-200E]
LAMBERT COORDINATES	:	N 443,879 E 2,246,826 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	330.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	312.8-ft, May88; 317.8-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ~+0.5-310.5-ft; 6-in stainless steel, +3.1--0.5-ft
ELEV TOP CASING	:	721.78-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	718.70-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	310.5-330.0-ft, 4-in #20-slot stainless steel; 309.5-329.6-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 31May88-22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

Figure A-3. Well 299-E17-15 Construction and Completion Summary (2 of 2)

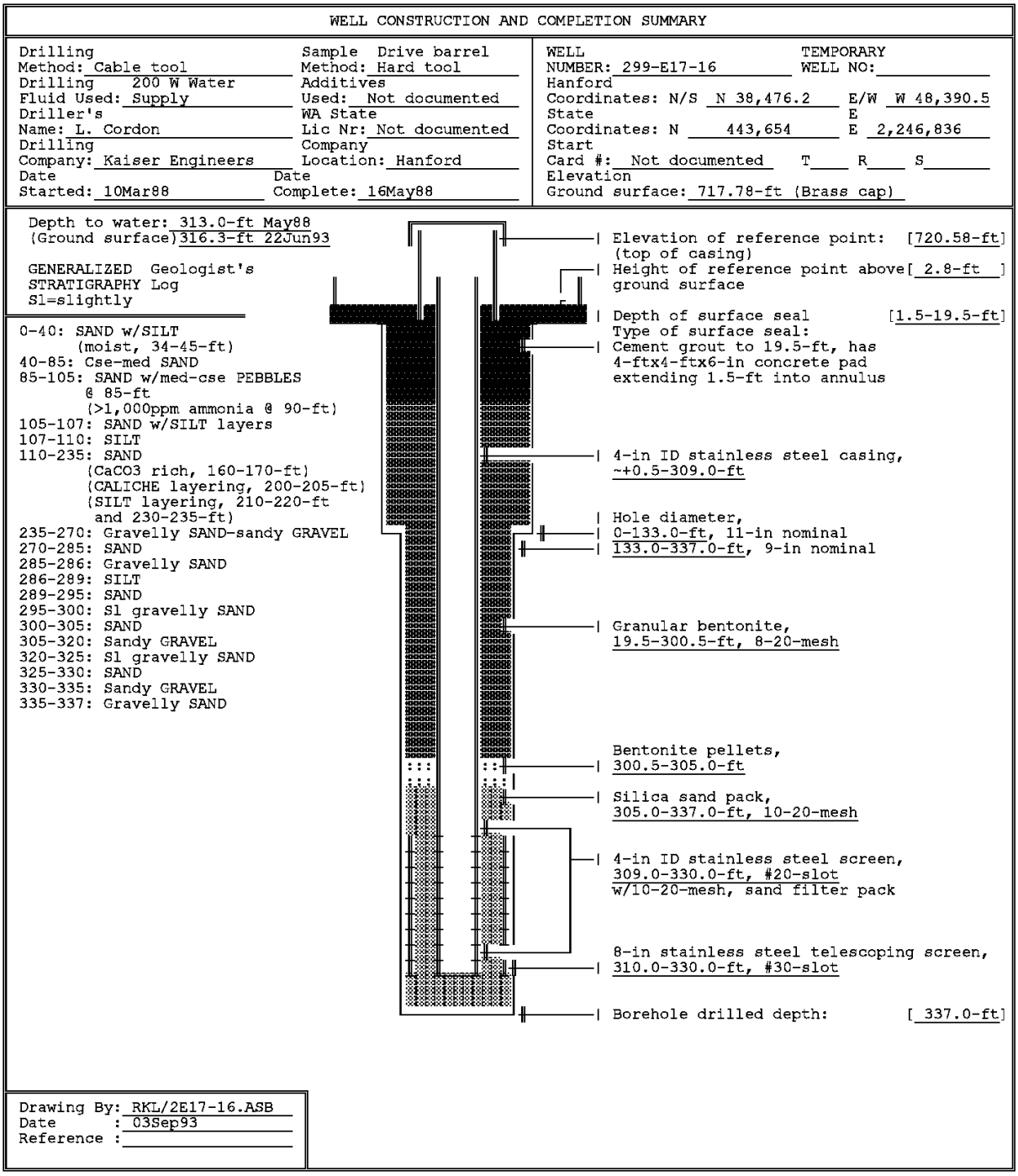

Figure A-4. Well 299-E17-16 Construction and Completion Summary (1 of 2)

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-16

WELL DESIGNATION	:	299-E17-16
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,476.2 W 48,390.5 [10Jun88-200E]
LAMBERT COORDINATES	:	N 443,654 E 2,246,836 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	337.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	313.0-ft, May88; 316.3-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ~+0.5-309.0-ft; 6-in stainless steel, +2.8--0.5-ft
ELEV TOP CASING	:	720.58-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	717.78-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	309.0-330.0-ft, 4-in #20-slot stainless steel; 310.0-330.0-ft, 8-in telescoping, #30-slot
COMMENTS	:	FIELD INSPECTION, 20Jan92; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 22Jun88-22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

Figure A-4. Well 299-E17-16 Construction and Completion Summary (2 of 2)

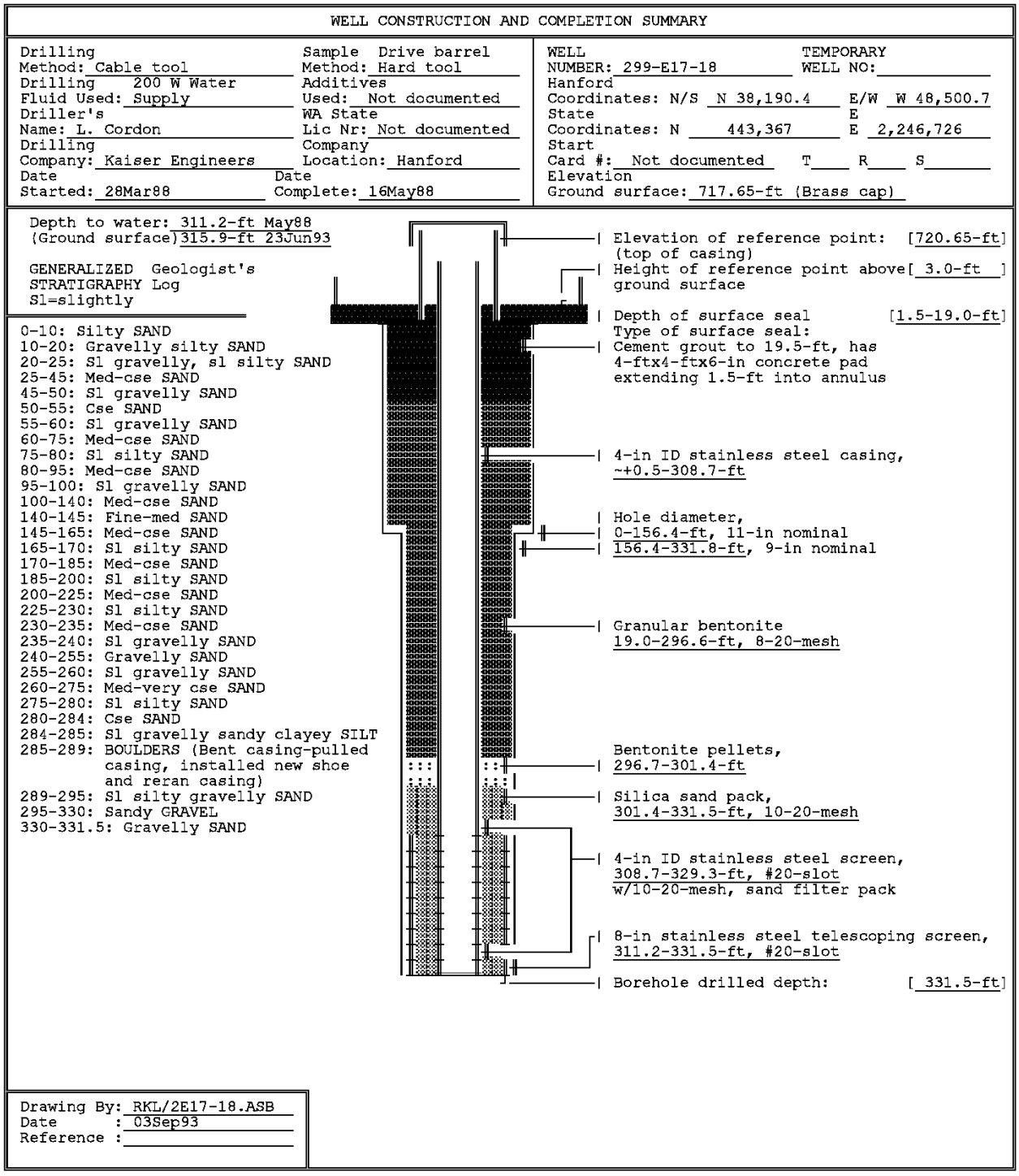

Figure A-5. Well 299-E17-18 Construction and Completion Summary (1 of 2)

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-18

WELL DESIGNATION	:	299-E17-18
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,190.4 W 48,500.7 [10Jun88-200E]
LAMBERT COORDINATES	:	N 443,367 E 2,246,726 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	331.4-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	311.2-ft, May88; 315.9-ft, 23Jun93
CASING DIAMETER	:	4-in stainless steel, ~+0.5-308.7-ft; 6-in stainless steel, +3.00-~0.5-ft
ELEV TOP CASING	:	720.65-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	717.65-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	308.7-329.3-ft, 4-in #20-slot stainless steel; 311.2-331.5-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 22Jun88-23Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

Figure A-5. Well 299-E17-18 Construction and Completion Summary (2 of 2)

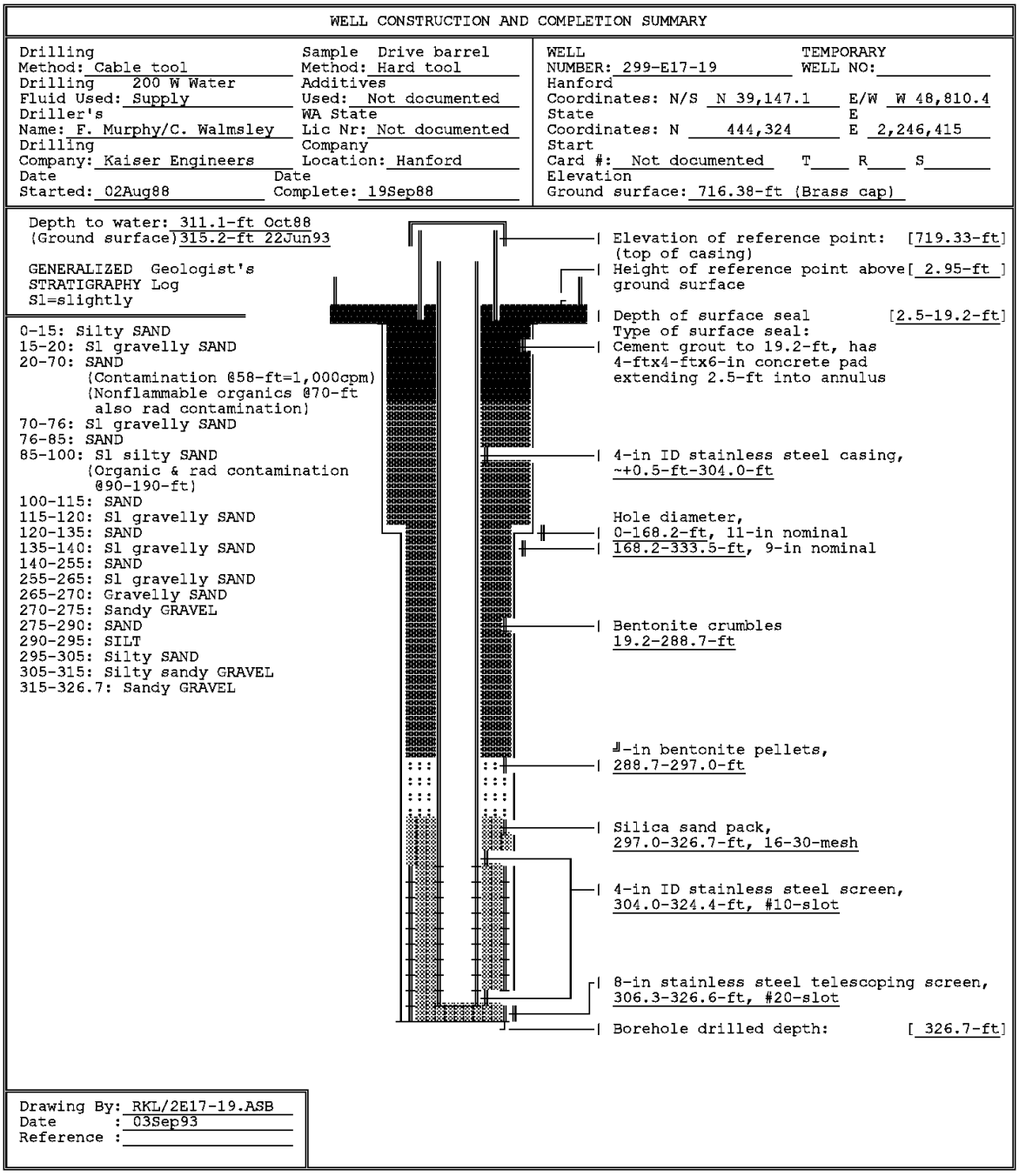

Figure A-6. Well 299-E17-19 Construction and Completion Summary (1 of 2)

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-19

WELL DESIGNATION	:	299-E17-19
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-10 Crib
HANFORD COORDINATES	:	N 39,147.1 W 48,810.4 [28Oct88-200E]
LAMBERT COORDINATES	:	N 444,324 E 2,246,415 [HANCONV]
DATE DRILLED	:	Sep88
DEPTH DRILLED (GS)	:	326.7-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	311.1-ft, Oct88; 315.2-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ~+0.5-304.0-ft; 6-in stainless steel, +2.95-~0.5-ft
ELEV TOP CASING	:	719.33-ft, [28Oct88-200E]
ELEV GROUND SURFACE	:	716.38-ft, Brass cap [28Oct88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	304.0-324.4-ft, 4-in #10-slot stainless steel; 306.3-326.6-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 11Oct88-22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

Figure A-6. Well 299-E17-19 Construction and Completion Summary (2 of 2)

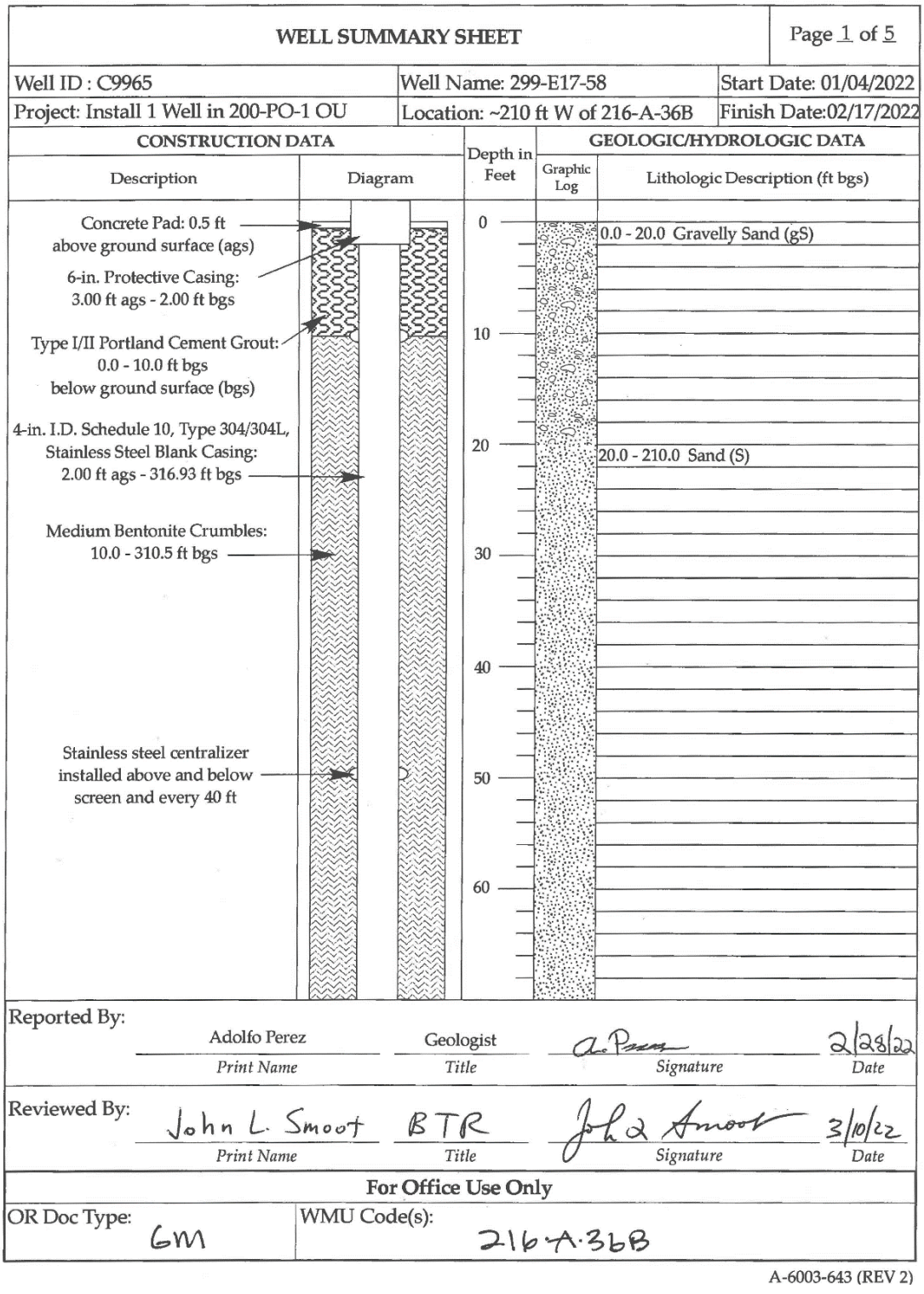

Figure A-7. Well 299-E17-58 Summary Sheet (1 of 5)

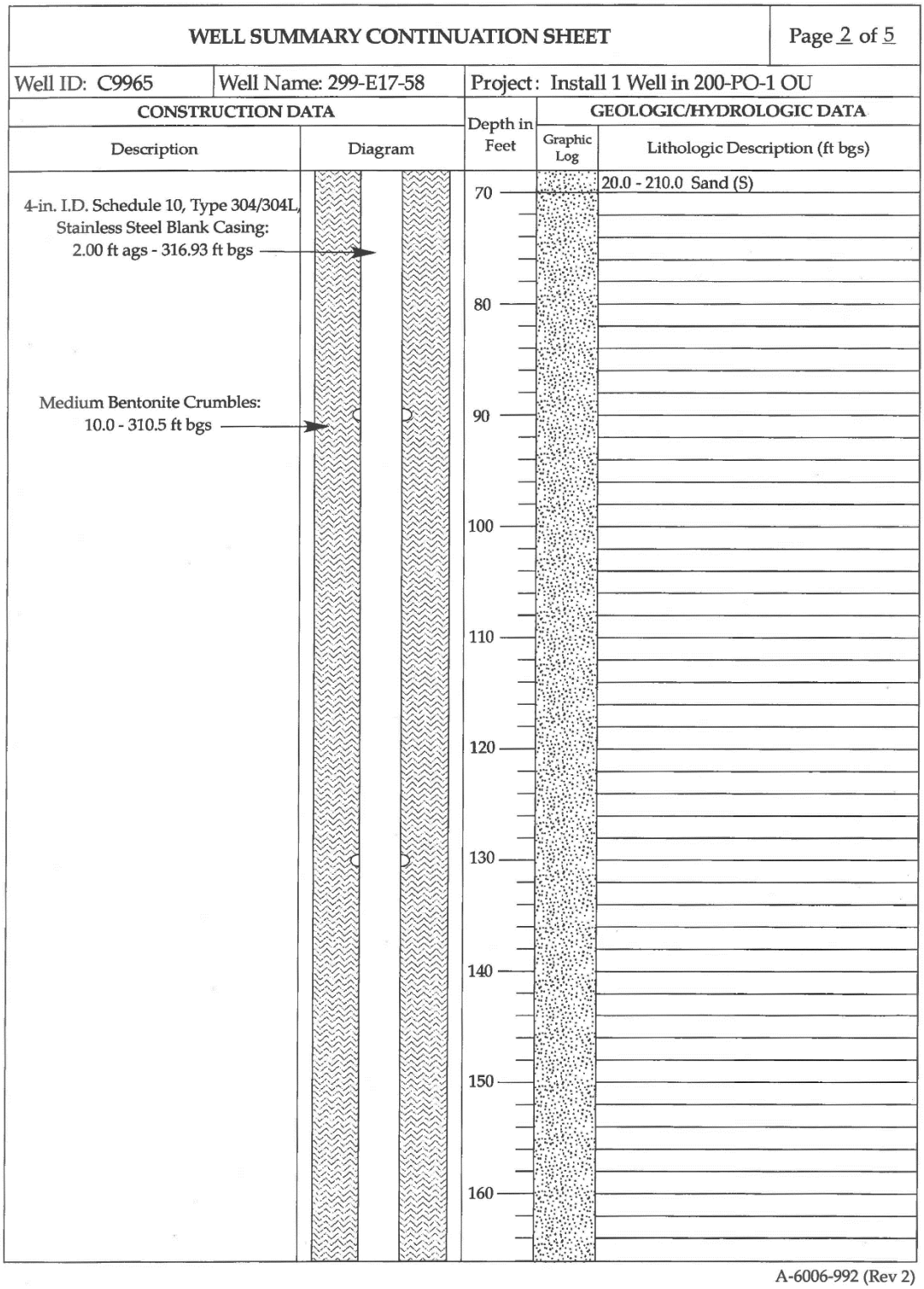

Figure A-7. Well 299-E17-58 Summary Sheet (2 of 5)

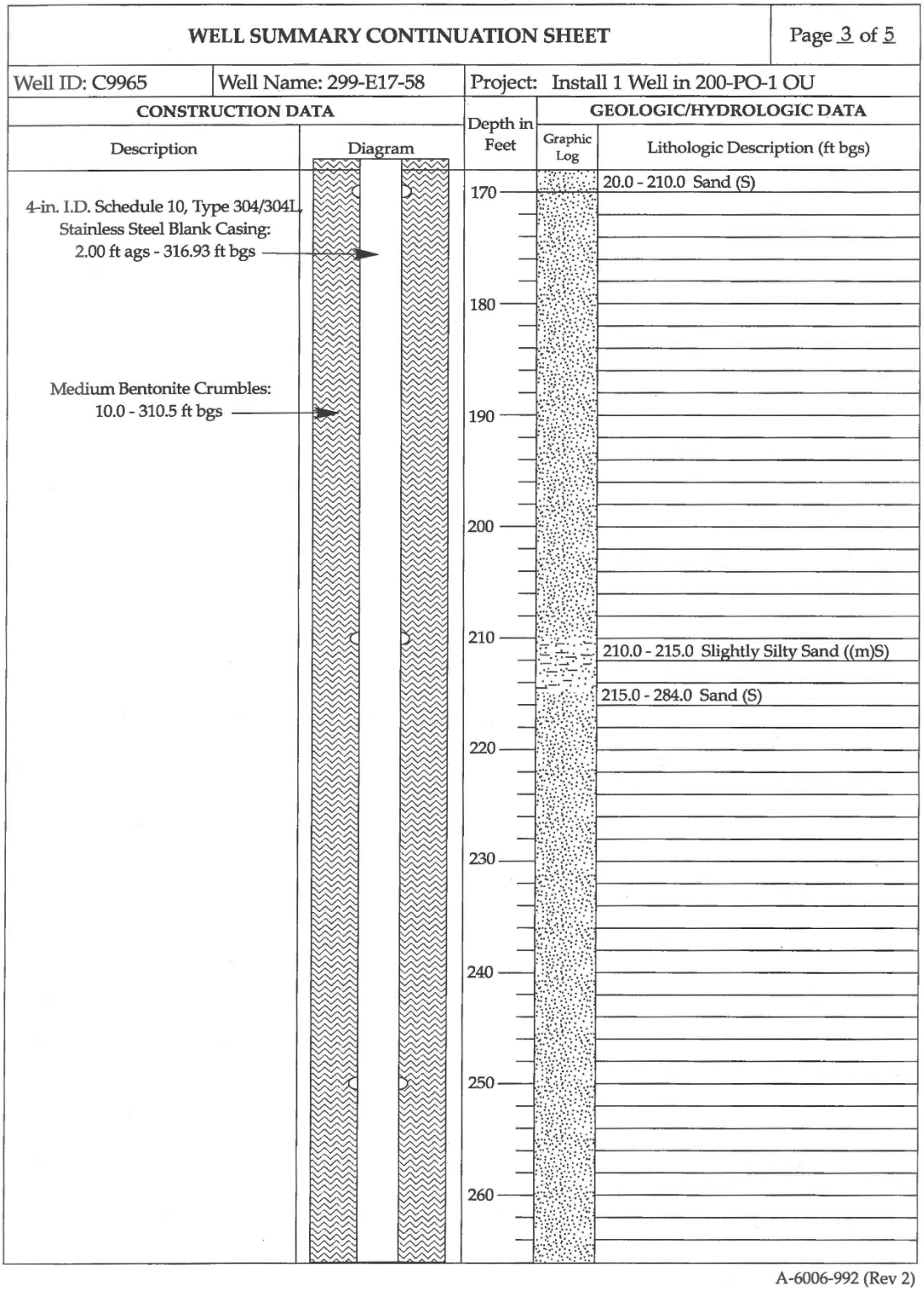

Figure A-7. Well 299-E17-58 Summary Sheet (3 of 5)

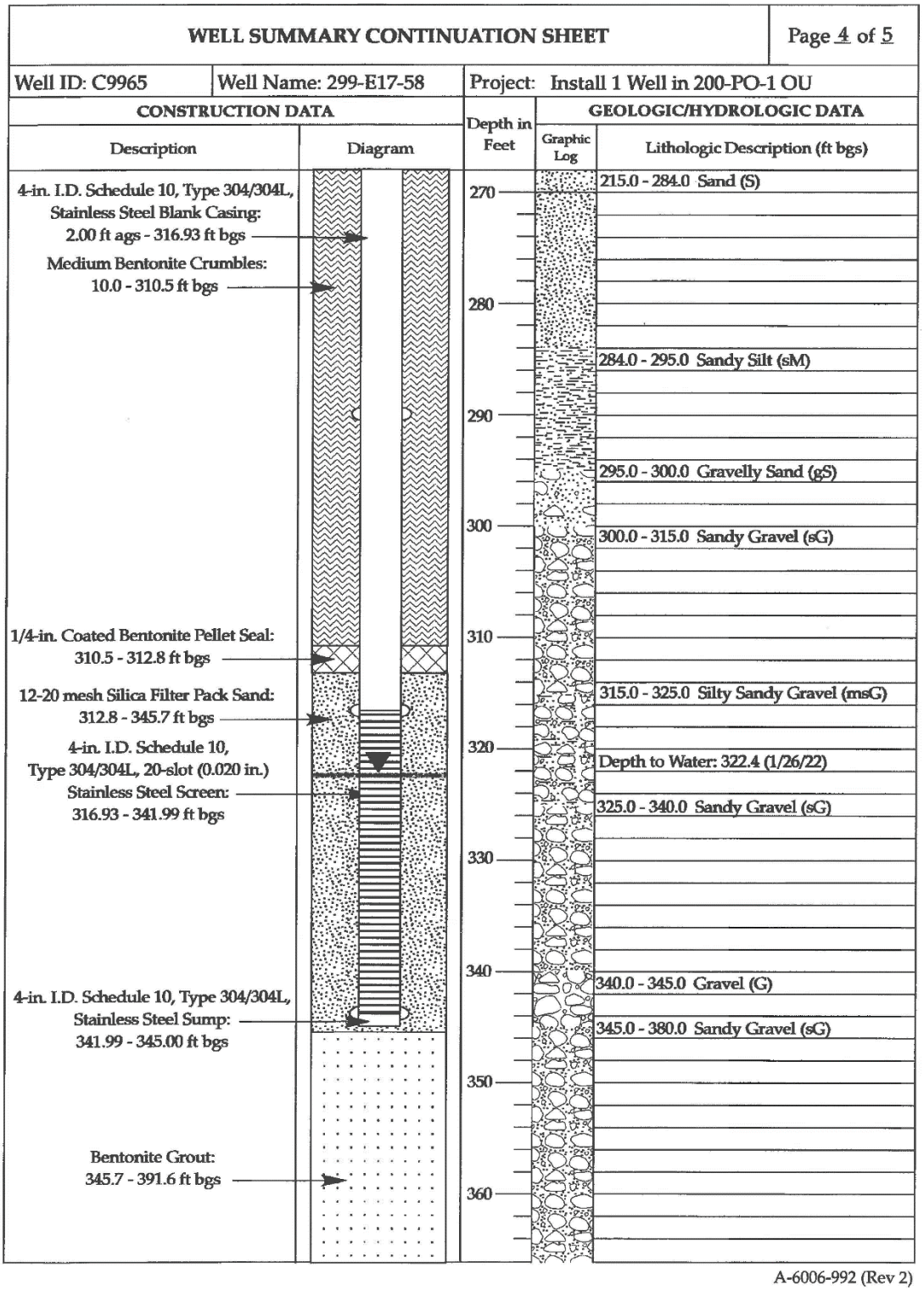

Figure A-7. Well 299-E17-58 Summary Sheet (4 of 5)

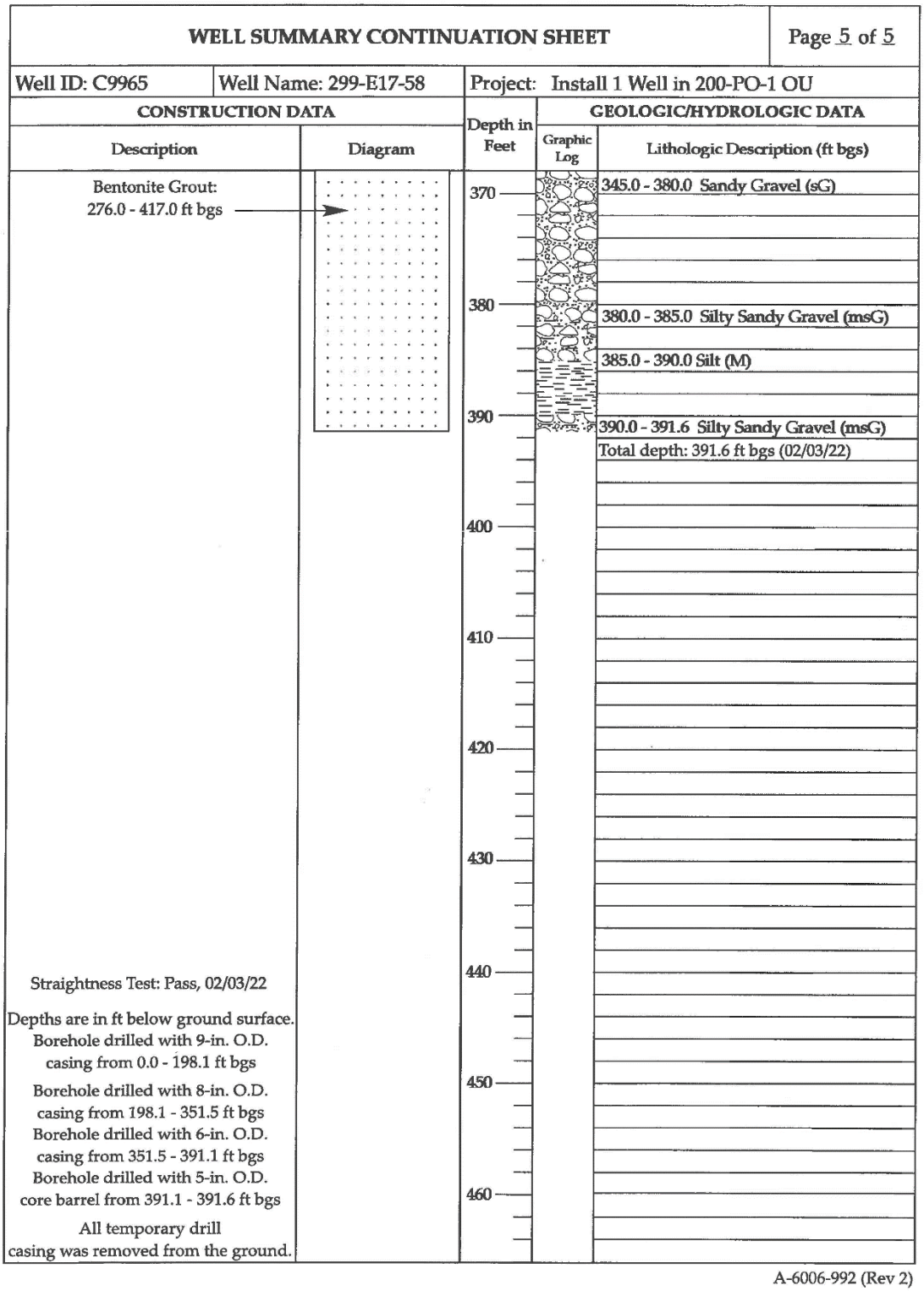

Figure A-7. Well 299-E17-58 Summary Sheet (5 of 5)

A2 Reference

NAVD88, 1988, *North American Vertical Datum of 1988*, as revised, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland. Available at: https://www.ngs.noaa.gov/datums/vertical/.

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